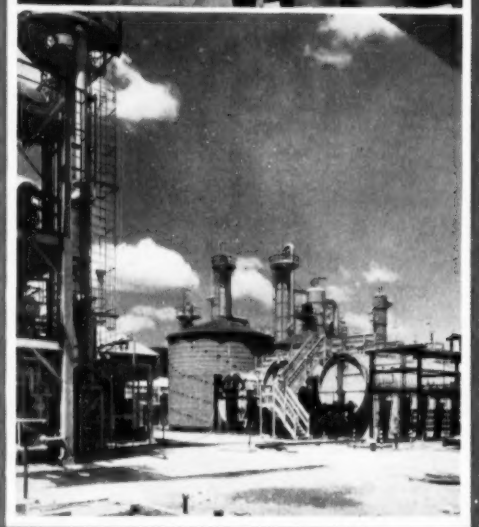
Chemical Week

January 30, 1954 Price 35 cents



Be prepared to bargain this year on union workers' new demand: guaranteed annual wage . . p. 24

It started as a plastics school for salesmen, but now customers come too . . . . . p. 32

Silicon outbids germanium as transistor material for high-temperature jobs . . . . . p. 43

Upgrading meta- and para-xylene is a neat trick; new plant, new process may turn it . . . . . p. 64

More synthetic glycerine offsets soapers' decline, adds fuel to hot polyol fight . . . . . p. 73

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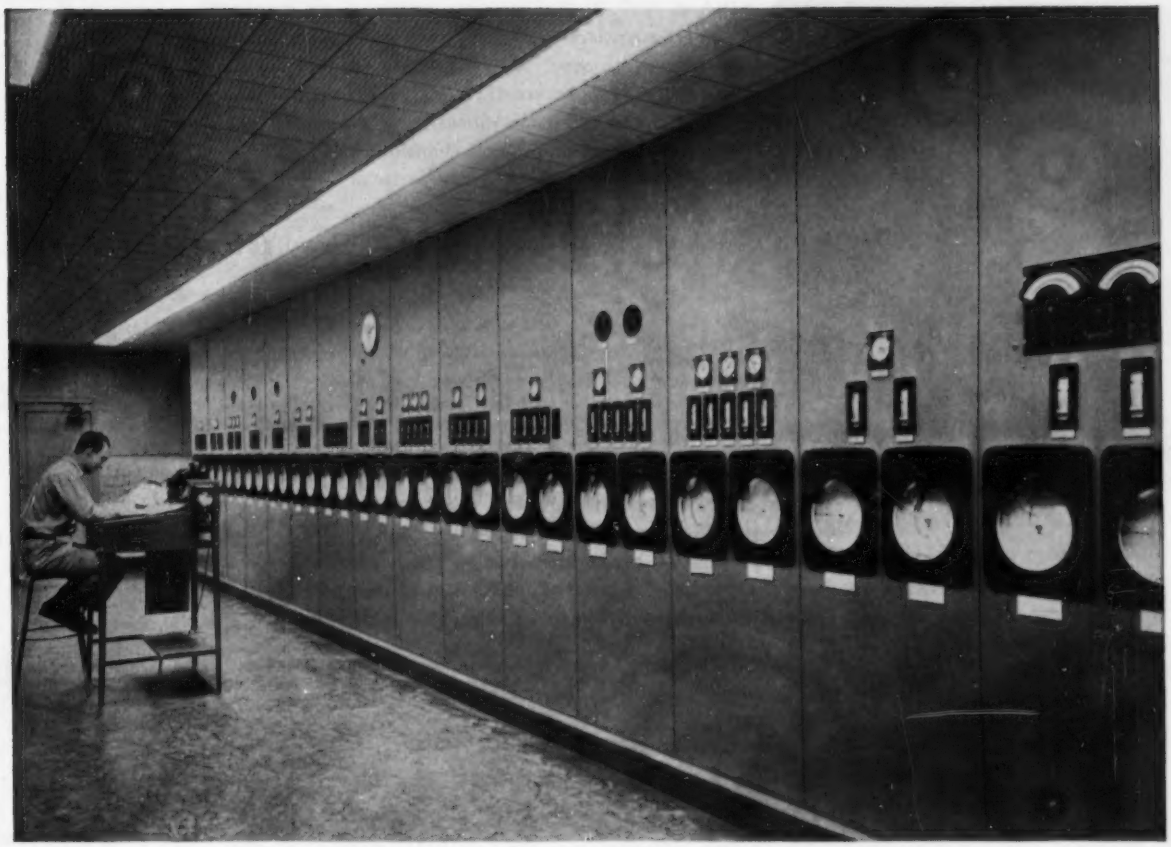

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Acidity, after CO_2 removal, ppm. max.	1.0
Alkalinity as NH_3, ppm. max.	1.0
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Chemical Week

Volume 74 January 30, 1954 Number 5

OPINION	4	RESEARCH	43
NEWSLETTER	11	SPECIALTIES	52
BUSINESS & INDUSTRY	15	PRODUCTION	64
DISTRIBUTION	32	MARKETS	69

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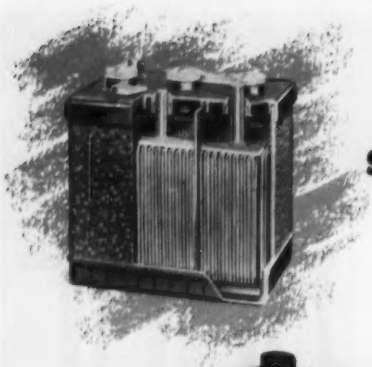
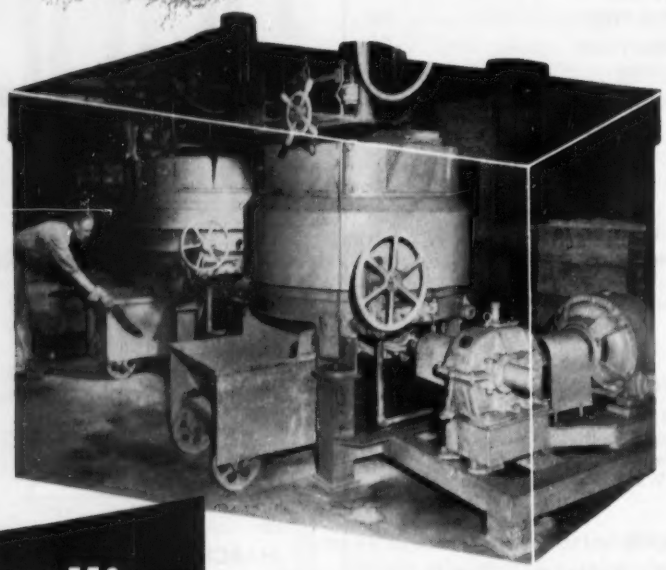


in preparing STORAGE BATTERY PASTES



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OPINION. . . .

Fresh Viewpoints

TO THE EDITOR: Let me reply to Mr. Cheltenham's letter (*Jan. 16*) in which he said that many executives have been hypnotized by making profits all the time . . . might not be able to readjust to more competitive business conditions.

Come hard times, about three things will occur (or are happening already): the very small outfits that don't fold up will look around for other products to manufacture; the larger, more progressive companies, which have spent $50 million or more apiece on new plants and even newer processes, will just as open-mindedly survey their operations to reduce costs, make their plans more economic; the older, we-know-it-all firms, because of their established positions as leaders in the industry, will simply sit back and still make a profit—only less . . .

The answer to it all, as I see it, is more fresh viewpoints, and more open-mindedness . . .

SEYMOUR SCHWARTZ
President
S. Schwartz & Associates
New York.

Age No Guarantee

TO THE EDITOR: In your Dec. 26 issue (p. 48) you refer to a recent government sale of "extra-pure linseed oil." Newspaper reports have ascribed the extra purity to prolonged storage, during which the impurities ("foots") had time to settle out.

Many years ago, when I was chemist for the American Linseed Co., linseed oil in two of our out-of-town storage tanks had acquired considerable antiquity, and it was sold out at a premium as "aged and well-settled." Followed a deluge of both compliments and complaints. Some claimed that the oil was no better than the ordinary grade, others loved it, and a few claimed that it was the worst ever. I was delegated to ferret out the answer.

What I found was this: One of the storage tanks was partially exposed to the sun, so that on cloudless days

CW welcomes expressions of opinion from readers. The only requirements: that they be pertinent, as brief as possible.

Address all correspondence to: W. A. Jordan, Chemical Week, 330 W. 42nd St., New York 36, N.Y.

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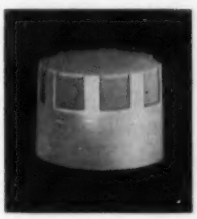

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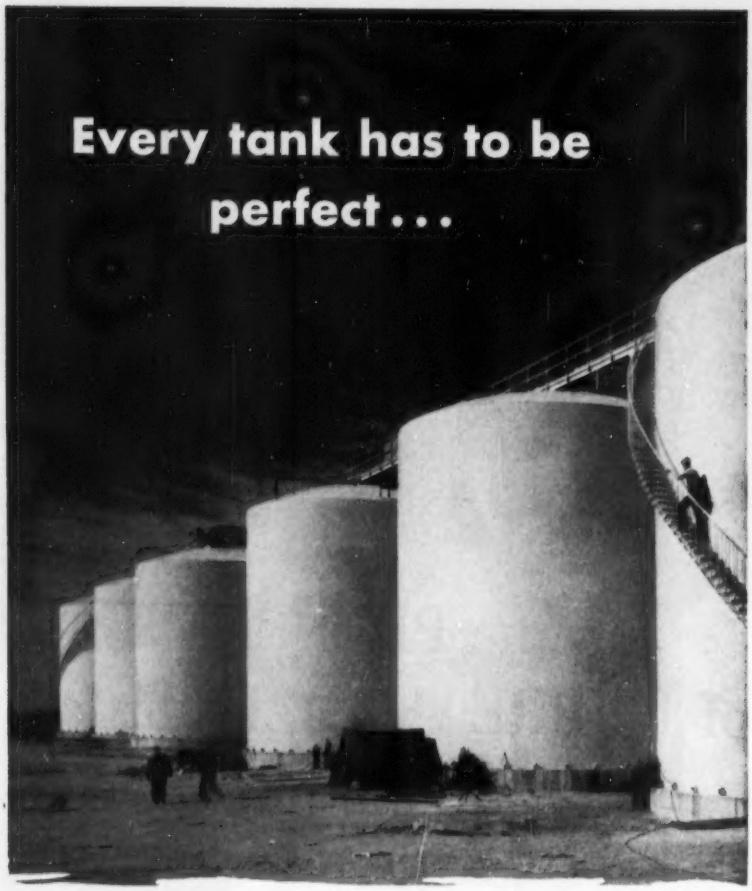

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OPINION . . . . . .

a revolving motion took place inside. In the other tank, located in the shade, the oil had settled all right, but the unfortunates who were served last got all the foots.

This incident is no reflection on the present situation, and I hope the government-owned oil is perfect. All I wish to point out is that old age alone is no more a guarantee of quality in linseed oil than it is of wisdom in men.

OTTO EISENSCHIML
The Scientific Oil Compounding Co.,
Chicago

Mirror Writing

TO THE EDITOR: I wonder if the picture on p. 27 of the Dec. 26 issue caught anybody's eye besides mine. The lettering appears in plain English in this picture, reversed—without a suspicion of Russian . . .

THOMAS H. CHILTON
Engineering Dept.
E. I. du Pont de Nemours & Co.
Wilmington, Del.

The truck was lettered for eccentrics who read over their shoulder by means of a mirror. Seriously, the picture was reversed for esthetic reasons—so the truck wouldn't appear to be driving off the page; we didn't think the lettering would be clear enough to show. —ED.

Grains/Gallon

TO THE EDITOR: That was an interesting news article on the fluoridation of water *(Jan. 16)* . . . and it is quite true, in my opinion, that fluoride treatment will reduce dental caries . . . Nonetheless, as you point out, people worry about being poisoned . . .

It is a very small quantity that is used . . . on the basis of 1.2 parts per million . . . it is out in the second decimal place in terms of grains per U. S. gallon . . .

In fact I calculate it at 0.07008 grains per gallon . . .

ROBERT L. SCHULTZ
Blue Mist Glass Spray Co.
Winona, Minn.

Not Medicine Men

TO THE EDITOR: I'm not a reader of your magazine, but a friend called my attention to your Jan. 16 article on fluoridation, and I must say I'm very disgusted. You'd like to ram rat poison down our throats just so your profit-bloated friends in the chemical industry could rake in even more ill-gotten gains. It's not enough that they get rich on making bombs and poison gas, now they've got to force sodium fluo-

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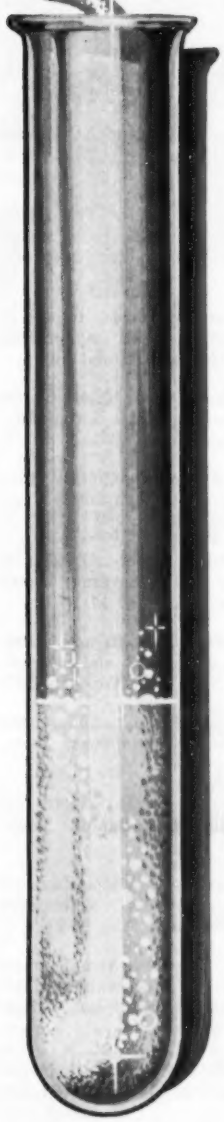

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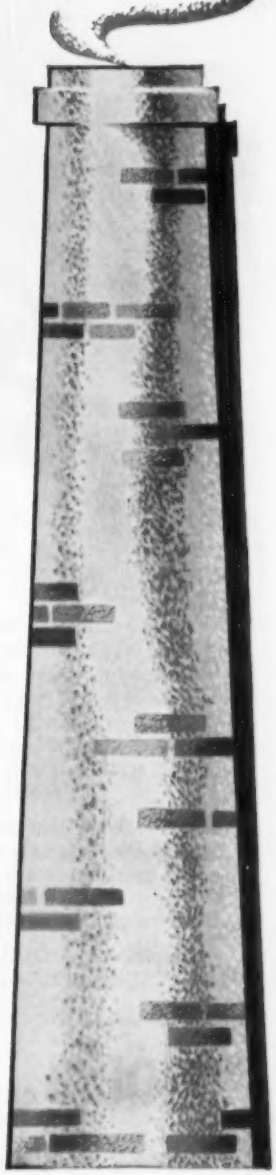

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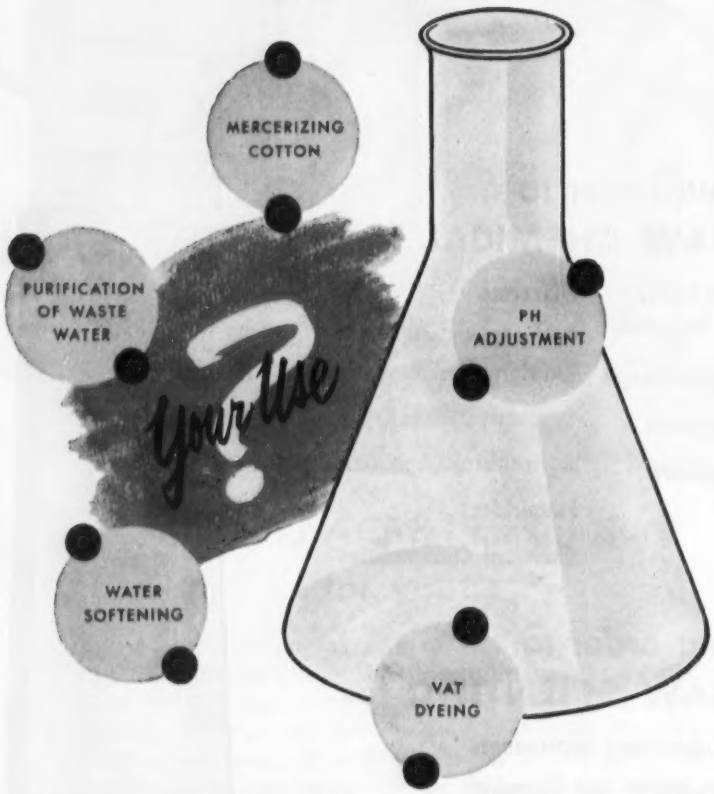

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OPINION . . . . . .

ride on a gullible and powerless public. First of all it's unconstitutional, I say, and more important it's dangerous to drink these chemicals year in and year out. Who knows but what it may cause kidney disease, heart disease, cancer, gall stones and many other conditions?

ESTHER JANEK
Santa Barbara, Calif.

Nonreader Janek obviously isn't familiar with our editorial philosophy. We're reporters and interpreters of news events and situations that affect our industry. We report the pros and cons of fluoridation because our readers are concerned. The toxicity question we leave to the medical men, for we do not presume to be qualified. It's obvious, too, that she isn't familiar with the profit structure, ethical standards and real character of our industry.—ED.

DATES AHEAD

Federal Wholesale Druggists' Assn., midyear meeting, Statler hotel, New York, Feb. 25-27.

Drug, Chemical and Allied Trade Section, New York Board of Trade, annual dinner, Waldorf-Astoria hotel, New York, March 4.

Chemical Institute of Canada, division of organic chemistry's third symposium, McGill Univ., Montreal, March 8-9.

American Pharmaceutical Manufacturers Assn., annual meeting, Boca Raton Club, Boca Raton, Fla., March 29-31.

National Farm Chemurgic Council, Inc., annual conference, Peabody hotel, Memphis, Tenn., April 5-7.

American Chemical Society, division of rubber chemistry, 65th meeting, Brown hotel, Louisville, Ky., April 14-16.

Assn. of Consulting Chemists and Chemical Engineers, symposium and banquet, Belmont Plaza hotel, New York, April 27.

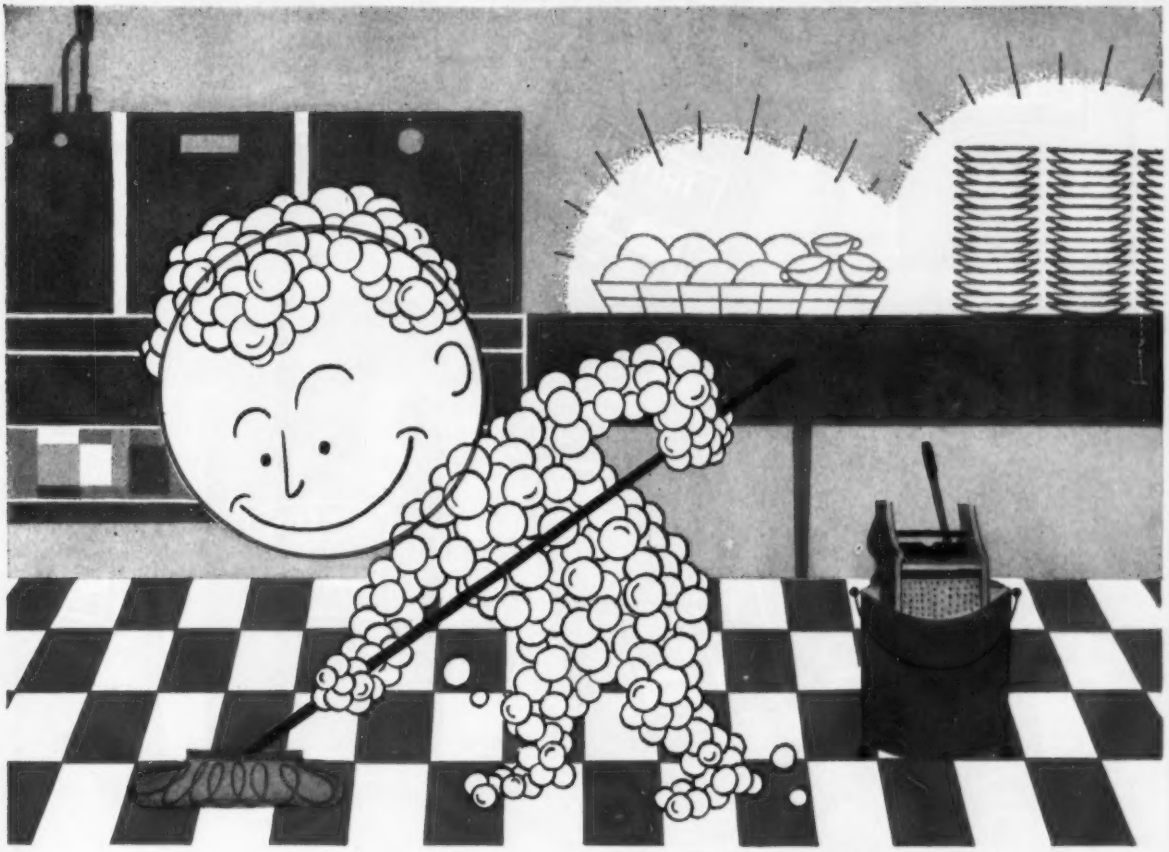
Air-Pollution Control Assn., annual meeting, Patten hotel, Chattanooga, Tenn., May 3-5.

Forest Products Research Society, national meeting, Grand Rapids, Mich., May 5-7.

Chemical Specialties Manufacturers Assn., midyear meeting, Netherlands Plaza hotel, Cincinnati, May 23-25.

Manufacturing Chemists Assn., annual meeting and joint outing with SOCMA, Greenbrier hotel, White Sulphur Springs, W.Va., June 3-5.

American Plant Food Council, annual meeting, Homestead, Hot Springs, Va., June 10-13.



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NEWSLETTER

The fate of American participation in construction of the controversial St. Lawrence seaway now is in the hands of the House, where a seaway bill never has reached the floor in the 30-odd years of Congressional debate on the subject.

Opponents of the measure, which cleared the Senate last week by a vote of 51 to 33, hope they can prevent the bill reaching the floor of the House. No hearings have yet been scheduled by the House Public Works Committee, but Chairman George Dondero (Mich.) is a strong advocate of the seaway; and with a push from the Administration, which has put a national defense tag on the project, the bill should come out of his committee.

Where the opponents hope to stop the bill is in the powerful Rules Committee. Rules Chairman Leo Allen is from Illinois, where railroad interests, particularly around the Chicago area, have developed considerable opposition to the project. Opponents hope they can draw support from Rules Committee membership and block the measure from reaching the floor. Speaker Joseph Martin, from Massachusetts, which is traditionally opposed to the seaway, is expected to give the measure only lukewarm support, if that.

In the Senate, Administration pressure coupled with Canada's decision to go it alone if the U.S. drags its heels on participation, resulted in passage of the legislation by the upper chamber for the first time. Four times before, the Senate turned thumbs down on the project after it had been favorably reported by committee. The bill was turned down just two years ago by a three-vote margin.

•

Sherwin-Williams formally introduced its brand-new Applikay interior paint (CW Newsletter, Jan 9) at a Chicago homebuilders' show last week. The translucent paint, put on with a special twin-roller device, enables user to apply a washable, figured design to painted walls. S-W developed it specifically for use with Super Kem-Tone; for durability, it must be applied before the Kem-Tone cures.

Still under wraps is another S-W project, Opal-Glo (for three years, Operation X). It's an aluminum-based paint designed for commercial rather than for home painting.

•

"Greatest plague of the Canadian drug manufacturer today is the influx of cut-rate American drugs being brought into Canada by subsidiaries of large American drug firms for distribution," says E. H. Moore of Moore-Thompson-Clinger, Ltd., pharmaceutical firm in Ontario.

"This wouldn't be so bad if Canadian manufacturers were allowed to ship their finished drug products into the United States; but we are not. Each batch of goods must go through long red-tape approval procedures with the U.S. Food & Drug Administration. So the situation amounts almost to an embargo."

Canadian manufacturers, whose business has suffered in the last few years, wouldn't mind if these American products were manufactured in Canada, he explains; but they do mind when the products are merely imported for distribution at prices under those of Canadian firms.

Five Buffalo firms that will eventually foot the bill for the Buffalo River Cooling Water and Dilution Project—designed to reduce pollution in that stream—got together to look at the cost: the estimate was $5.5-7 million.

The firms: Republic Steel, National Aniline Div. of Allied Chemical & Dye, General Chemical Div. of Allied Chemical & Dye, Socony Vacuum, and Donner Hanna Coke.

•

Two significant moves, of particular concern to chlorine-caustic makers, took place this week:

The Army, which had planned to lease its Muscle Shoals chlorine plant, now says it will consider outright sale of the unit. It actually canceled opening of the lease bids (scheduled for Feb. 1) to allow insertion of a sales clause in the agreement.

The Army decision came after a meeting with chlorine producers. Probable date for new bidding: 90 days hence.

And in Montague, Mich., DuPont firmed up plans for its long-secret (CW, Market Letter, Dec. 5) neoprene project. The company has options on 1,000 acres—adjacent to Hooker's now-abuilding chlorine-caustic plant—plans a $15-million neoprene unit. Construction will start late this year, is scheduled for completion in 1956.

Hooker, naturally, will be the chlorine source. Interesting, too, is the fact that Carbide also has options on acreage at Montague.

Hooker will supply hydrocloric; Linde will put up an acetylene plant—will ship in carbide from Sault Ste. Marie.

•

There's more brewing, too, in the Nicaro Nickel case. General Services Administration now admits that it is "jointly studying" with Freeport Sulphur the possibility of constructing a pilot plant (in the U. S.) to evaluate the company's nickel-cobalt extraction process.

One project that had been discussed: construction of a leaching plant in Cuba, which would yield a nickel-cobalt slurry. This would be shipped by sea to a proposed refinery near New Orleans. (The tanker would carry sulfuric acid on the return voyage.)

Negotiations on that, says GSA, didn't gel. Now the discussions center about a privately financed Freeport pilot unit. Two provisos: that the government enter into a purchase agreement, grant fast tax amortization.

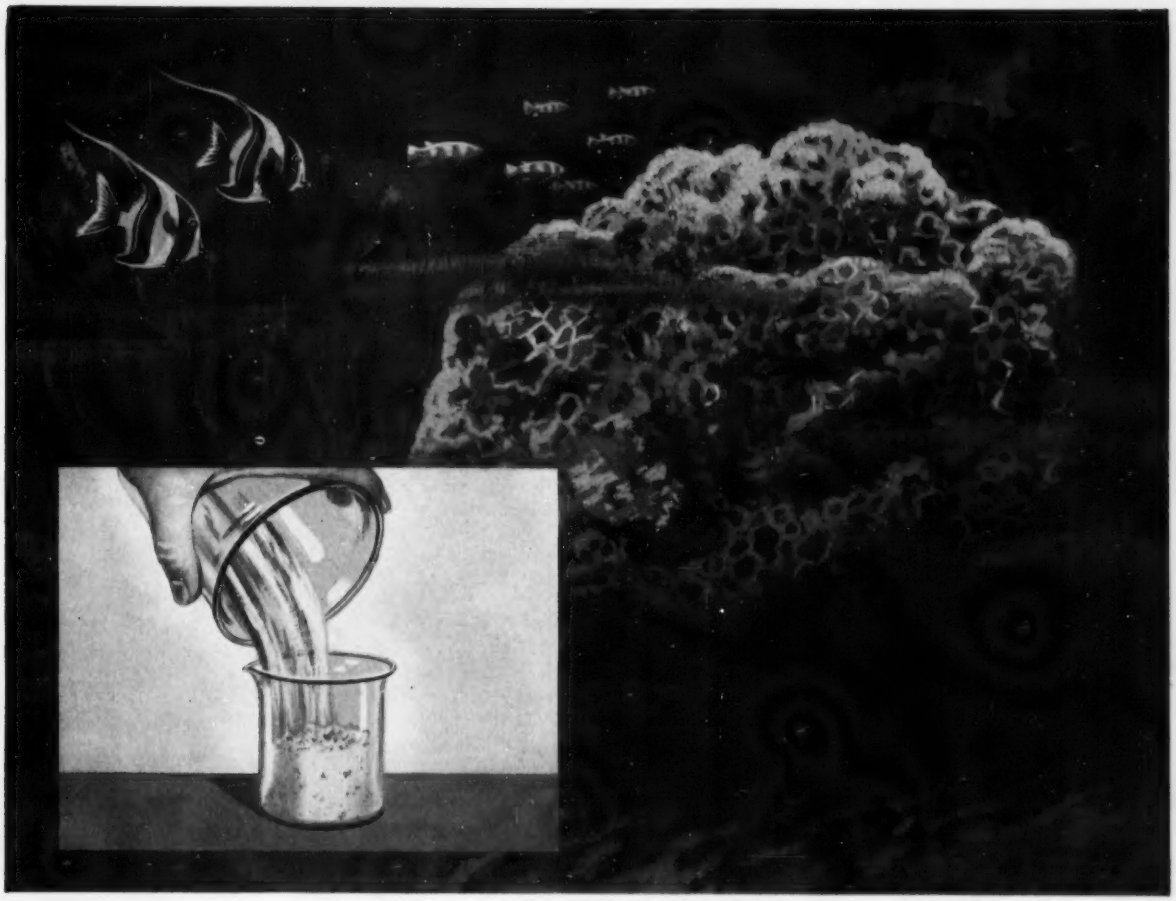
•

That industry has been trekking south in recent years is hardly news—and certainly not to New Englanders who have seen their textile business battered and disjointed. Now, however, the House Ways & Means Committee approved a proposal that would make interest on industrial development bonds issued by state and local governments subject to federal taxes. Southern governors are irked, but not upset. Their belief: the committee action will have but little effect.

•

A long-perplexing problem of pulp and paper mills may be chemically solved soon. A group of Canadian companies (headed by Howard Smith Paper, Montreal) is getting ready to exploit a patent to chemically debark logs. It involves applying sodium arsenite to girdled trees (during the sap season). Result: easy to separate bark from wood.

. . . The Editors



Like nature's porous sponge, Celite has extremely high absorptive capacity. It absorbs 220% of its own weight of water (Gardner-Coleman method)

High absorption

Celite diatomite powders absorb twice their own weight of liquid

Here is a material in powder form, so porous that 93% of its volume consists of tiny interconnected pores. This unique structure gives Celite* an exceptionally high absorptive capacity which is now being put to profitable use in a wide variety of industries. For example, Celite serves as a dry carrier for insecticide poisons . . . helps control viscosity in adhesives . . . and makes a highly effective anti-caking agent in fertilizers.

The unique structure of the microscopic Celite particles offers many other advantages. These particles are spiny and irregularly shaped, strong and rigid . . . as a result they do not pack together. Thus Celite powders have great bulk per unit weight . . . making them valuable for fluffing up dry powders such as household cleansers . . . and extending pigments in paint and paper.

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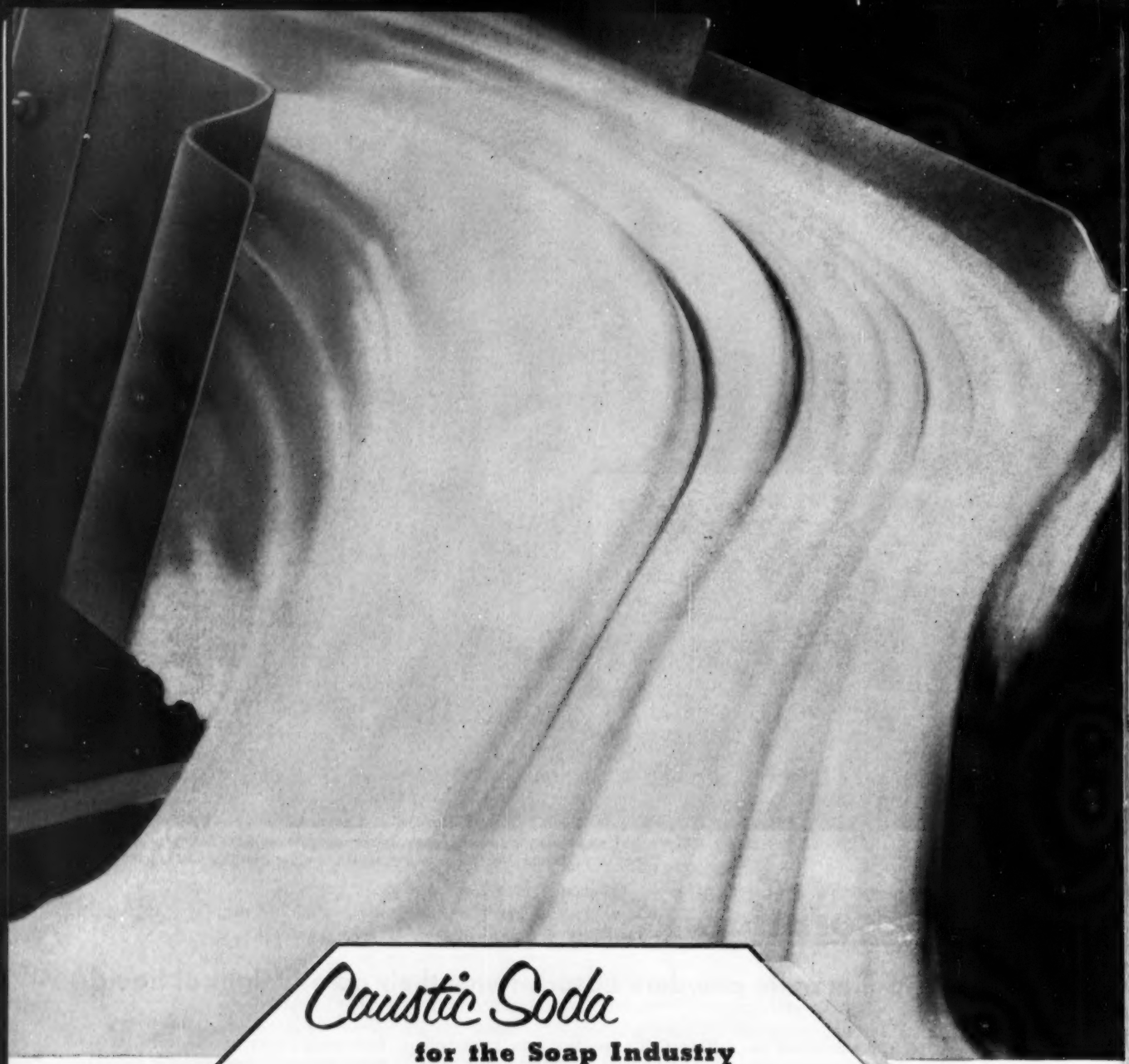
If you want improved product performance or lower production costs, investigate industry's most versatile mineral filler. One of the J-M Celite Engineers will gladly discuss your problem. These men are backed by complete technical services and the Johns-Manville Research Center, largest laboratory of its kind in the world. For further information write Johns-Manville, Box 60, New York 16, N. Y. In Canada, 199 Bay St., Toronto 1, Ont.

*Celite is Johns-Manville's registered Trade Mark for its diatomaceous silica products.

Johns-Manville CELITE INDUSTRY'S MOST VERSATILE MINERAL FILLER



Caustic Soda

for the Soap Industry

Caustic soda is one of the basic chemicals required for the manufacture of modern soaps.

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BUSINESS & INDUSTRY . . .

For Prolonged Prosperity

Industrial expansion—of which chemical companies are expected to account for a large share—is what the Eisenhower Administration is banking on to counteract any slide toward a recession.

This could be seen in the President's budget and tax recommendations for the fiscal year beginning July 1—the first budget plan to be entirely drawn up by the new GOP regime. In general, Eisenhower's detailed proposals look good for the chemical and allied industries. His budget message indicates that:

- Government operations affecting the chemical industry will be about the same as last year.
- Total federal spending will be down.
- Tax policy will be revised in a move to keep business in its present healthy state.

Congressional Concurrence: There's a lot of good news for fast-growing chemical companies in the President's plans to amend federal tax rules. His state-of-the-union message pointed in this direction (*CW, Jan. 16*), and his more specific messages sound even cheerier for growth companies.

Central purpose of some 23 proposed tax changes is to provide more head room for expanding industries. The Administration is pinning its plans for continuation of prosperity to these changes. Most of the President's ideas are expected to get swift and friendly treatment by Congress.

Heading the list of Eisenhower suggestions is quicker write-off of new plant and equipment for tax purposes, two-thirds of the cost to be written off during the first half of the property's useful life. Paired with this is a recommendation that the present one-year loss carry-back be extended to two years; the idea is to reduce the dollar burden of companies' risk in the early years of an expansion program. The present five-year carry-forward for losses would be retained.

Foreign Investment Incentive: Other GOP tax proposals include liberalization of Section 102 rules to encourage small, tightly held companies to plow back more of their earnings into their business; allow such corporations the option of being taxed as a partnership; simplify the rules about corporate reorganization so tax consequences will be clearer; and liberalize tax laws so as to encourage U.S. companies to invest more money abroad.

PRESIDENT EISENHOWER: Chemical industry will get a good break.

On government research, also on government regulation of chemical industry functions, the 1955 Eisenhower program is pretty close to that for the current year ending in June (*see table*).

If Congress agrees with these recommendations, Food & Drug will be down $62,000; Antitrust will lose $225,000; Federal Trade Commission will gain $46,000. Actual research and development in the National Bureau of Standards will stay constant at $4.5 million, AEC's research allotment will rise $5.3 million, Bureau of Mines research money will be $1.2 million less.

Among aids to business, a $900,000 increase is recommended for the Commerce Dept.'s Business & Defense Services Administration, with that agency's Chemical & Rubber Div. tentatively scheduled for an increase in personnel from the present 32 to 55.

Thus both taxation and budget figures provide evidence that chemical and other growth industries rate high in the Administration's antirecession planning. While spending affecting these industries will remain practically unchanged, total expenditures are to drop by more than $5 billion from this year's $70.9 billion.

Chemical Highlights Of First Eisenhower Budget

(In millions)

	Fiscal 1954*	Fiscal 1955**
Atomic Energy Commission—research#	$271.8	$261.3
National Science Foundation—research	4.3	8.6
Food & Drug Administration	6.3	6.2
GSA Critical Material Stockpile	257.0	301.0
TVA Fertilizer and Munitions##	18.9	17.9
Agricultural Research	48.4	63.4
National Bureau of Standards	8.7	8.8
Bureau of Mines—research	18.3	15.4
Public Health Service—Industrial pollution, hygiene, sanitation activities	3.3	3.3
Dept. of Justice—Antitrust Division	3.5	3.1
Federal Trade Commission	4.0	4.2
Dept. of the Army—Atomic, biological and chemical warfare research	65.7	61.7
RFC Synthetic rubber research	5.2	5.2

*Estimate of expenditures for fiscal year ending June 30, 1954.
**Funds requested by the President for fiscal year ending June 30, 1955.
#All research funds include spending for new plant facilities.
##Expenditures from appropriation and revolving fund.

IG HOCHHAUS: Main offices in Frankfurt, rebuilt since the war, are today's nerve center of German chemical industry.

West German Trade

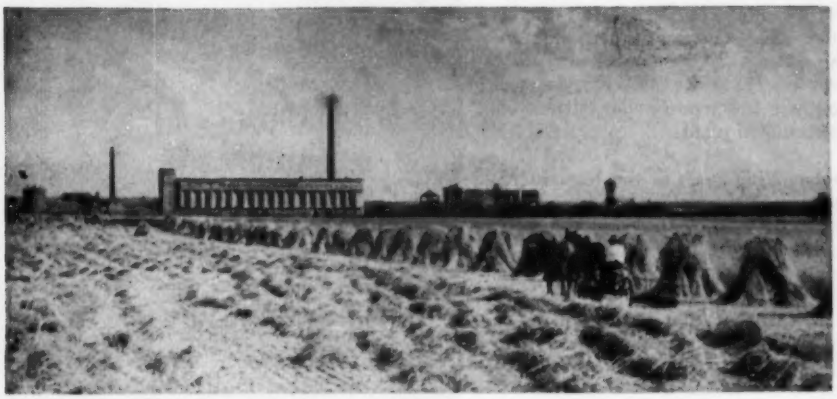
Led by the successor companies of Germany's former chemical giant, I. G. Farben, West Germany today ranks third among the world's chemical exporters. Production in all sectors of the industry is running far ahead of schedule; manufacturers are looking at further export possibilities to soak up surplus plant capacity.

Typical of the extent to which recovery has been made: Farbenfabriken Bayer AG at Leverkusen (largest successor of the Farben combine) this week reports domestic sales up 12% in 1953, export sales up 32%. Of special note: Bayer's startling rise was accounted for by activity in all sectors of manufacture; its synthetic fibers, dyes, photographic chemical sales are expanding as rapidly as did basic chemical production.

Surplus plant capacity is said to exist in soap and paint manufacture as well as in dyestuff production

COKE INDUSTRY: Production is due for a 25% rise in the months ahead.

THE TWELVE APOSTLES: Cooling towers of Bayer plants are scattered . .



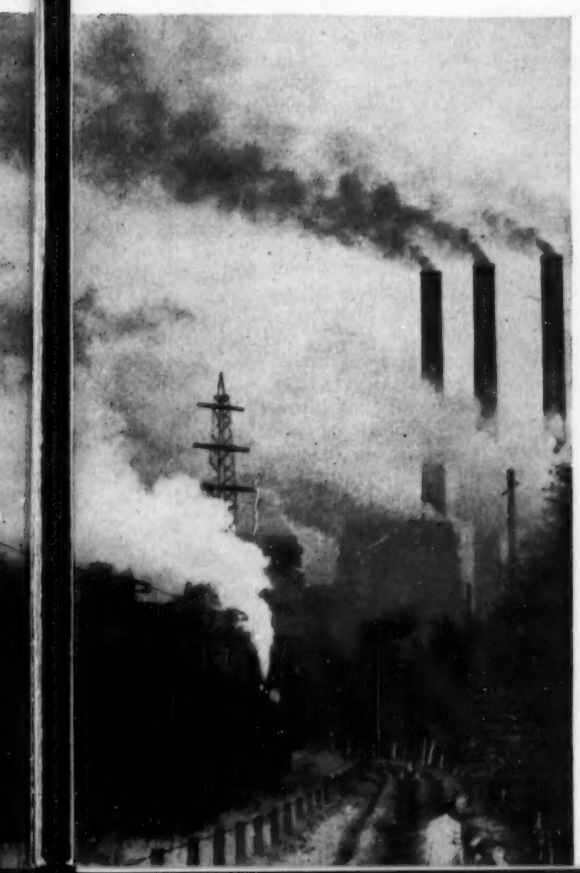
FARBENWERKE HOECHST AG: Pharmaceutical, synthetic fiber output soars.

Still Surging

throughout the country. The fertilizer producers, with major plant expansions currently under way, are openly canvassing world markets for potential consumers. Expansion of the German coke-oven industry, which has been working at full capacity for some two years, in the past few months has received a special boost with the installation of facilities designed to lift output some 25%. A new pressure refining plant for the production of crude benzene has just been put into full operation at the Amalia pit of the Harpener Bergbau AG, will turn out 6,000 metric tons of benzene monthly.

Starting in March, Bayer's Dormagen plant will be producing 30 tons of Bayer-Acrylfiber—an acrylic fiber resembling Orlon—slated largely for export; research to "further swell German plastic production" is progressing at a pace disturbing to foreign competitors. Indicative of the German determination to lead the European plastics race is the recently formed Research Institute for Plastics in Frankfurt, pledged to spend DM 1.3 million over the next three years in basic research in the plastics field.

. . . throughout the country.



Demotion of 3 Dyes

Milady's favorite shade of lipstick may suddenly vanish from the market if Food & Drug Administration goes ahead with its move to decertify those three controversial dyestuffs, Orange 1 and 2 and Red 32 (*CW, Dec. 12, '53*).

Cosmetic makers are protesting against the sudden and sweeping action of decertification, are asking that FDA simply transfer those three colors from their present listing (suitable for use in foods) to a separate list that would permit continued use of the dyes in drugs and cosmetics.

FDA experts testified at last week's hearing that eating too much food containing these dyes can cause sickness, even death. If the agency decides on decertification, the dyes automatically will be crossed off all U.S. food, drug and cosmetic lists. The colors then could be added to the drug-and-cosmetic-use list only after further extensive testing and hearings. Cosmetic firms, already waist-deep in operations that use the dyes, have until March 1st to file briefs.

COLORADO'S MILLIKEN: On "trade, not aid" proposals, still not persuaded.

Showdown in '55

As every auto salesman bears in mind when a man and wife enter the showroom, there's no sale unless you convince the one who counts; and on the question of foreign trade and tariff, the free-trade majority of the Randall commission has failed to convince key members of Congress—such as Eugene Milliken (R., Colo.) of the Senate finance committee, who refrained from signing the report out last weekend.

Accordingly, chemical companies that might be damaged by increased imports can relax for another year, confident there'll be no abrupt lowering of duties while the 83rd Congress is in session. Instead, it appears that the only Congressional action on tariffs this year will be another extension of the Reciprocal Trade Act, with the real showdown postponed until next year. And that will be hard fought.

On paper, the 16-man commission picked by President Eisenhower last summer has come up with a strong policy favoring expansion of international trade. Chairman Clarence Randall and his allies on the commission are asking that the President be empowered: to reduce tariffs 5% a year under a three-year extension of the Reciprocal Trade law; to reduce all tariffs to not more than 50% ad valorem; and to disregard the Tariff Commission's recommendations on escape clause and peril point proceedings.

COMPANIES . . .

Reynolds Metals Co. will pick up the check on a $244,701 contract to build a new cross dike and a $184,690 contract to strengthen a main Columbia River levee, company officials say. Under terms of the deal (with two drainage districts and the U.S. Corps of Engineers), Reynolds will also contribute property right-of-way for the cross dike. Reason: a desire to protect Reynolds' plant at Troutdale, Ore., as well as neighboring farm and residential property, from the type of destruction that struck the area in the Columbia flood in 1948.

•

The Carborundum Co. has completed plans to acquire capital stock of American Tripoli Corp., Seneca, Mo., company representatives say. The purchase is part of Carborundum's expansion plans into kindred lines of production.

•

International Minerals & Chemical Corp. has formed a new Phosphate Chemicals Div. to handle the company's growth in phosphate chemical operations, timed with the completion of work on its new Bonnie plant, near Bartow, Fla. The Phosphate Minerals Div., charged with responsibility for the mining and refining of phosphate ores in Tennessee and Florida, will continue to operate under current organizational plans.

•

Outstanding stock of the Niagara Alkali Co., Niagara Falls, N.Y., is being doubled to 600,000 by a 100% stock dividend, which is being issued to present stockholders.

•

Allied Chemical & Dye Corp. plans to repay a $50-million loan to a group of banks this week. The loan—consisting of 3% notes, due Aug. 1, 1955, will be repaid out of general funds now available for the purpose. It was made in 1952 with right of prepayment without premium for use in now-completed expansion projects.

•

Chemical Construction Corp. will manage and operate Calera Mining Co.'s new cobalt refining plant at Garfield, Utah, for a period of two years commencing Feb. 15. The move's intended to enable Chemico (which designed and constructed the plant) to place the operation on a "successful commercial basis."

WIDE WORLD

HEALTH DEPT.'S HOBBY: More social security for more people in '54.

Enlarged Umbrella

Chemical companies in the U.S. now stand to pay about $11 million more in social security contributions this year than they paid during 1953; and if Congress approves the program suggested by Health, Education & Welfare Secretary Oveta Culp Hobby and recommended by President Eisenhower, the cost to firms in chemical and allied industries will be up by $18 million.

This is on the assumption that employment, wages and salaries in these industries will hold to present levels through 1954. On that basis, chemical companies will ante up approximately $50 million to the Social Security Administration this year, providing the Eisenhower proposal wins favor on Capitol Hill.

Last year, the rate of contribution was 1½% for both employers and employees, with nothing collected on income beyond $3,600/year. This year, the rate is up to 2%, and the Administration wants the taxable base to be lifted to $4,200/year.

The government has turned its back on the "rugged individualist" school of thought, which favors pruning away the social security program, leaving each person responsible for his own old-age arrangements. Not only are Eisenhower and Hobby asking for higher social security taxes and benefits; they're also asking that the social security program—pictured as an umbrella that now shields only about one-third of the country's working populace from "rainy day" want—be enlarged to cover between 10-11 million additional people.

Looking to the Future

THANKS to U.S. State Dept. and to Sun Oil Co. cooperation, the petrochemical industry in the Philippines is getting a healthy start. Timed with construction of the first refinery to be built in the Islands, Sixto Acuna is receiving on-the-job training in American technology at Sun's Marcus Hook refinery, plans to return home after a two-year period to put his newly acquired knowledge to practice. Lauding the experiment: the Voice of America (*see cut*), which beams Acuna's gratitude to worldwide listeners.

Roll Call of Major Publicly Owned Chemical Companies
Still Without Debt

Du Pont	Pennsalt
Hercules	American Agricultural
Eastman Kodak	Victor

Bootstraps No Longer

When balance sheets are slipped in the mail this year, stockholders of many chemical companies may be in for something of a surprise. For though the equity financing revival is still spiraling upward, early Security & Exchange reports for 1953 confirm that the debt financing urge today is more firmly rooted in the plans of most chemical executives than in any previous year. Best guess: when fourth-quarter returns are tallied up, chemical companies will be found to have secured five times as much money last year through bond financing as they did through sale of common stock.

Reason for the popularity of debt financing, say most company treasurers queried in a recent CW analysis, is basically twofold. Under U.S. law last year, a company in top excess-profits brackets could pay as much as 6.67% for its borrowed funds without cost to the corporation—because of a credit-exemption clause in the EPT law allowing nearly 10% on the borrowed amount "to be applied against taxable earnings." Because many chemical companies found themselves in top brackets, the advantage to be gained in comparison with the double taxation of stock dividends is immediately obvious. Adding to the financial advantages in debt financing: government-issued certificates of necessity, favorable leverage factors.*

Second major reason for the popularity of debt financing is the question of expediency. "Since growth is made possible by the ready availability of funds to move ahead of your competitor," one comptroller points out, "growth in the chemical industry today means debt financing . . . bringing new money into the concern above and beyond what the company is able to earn and retain on its own." Even with tax rates scheduled for a drop this year (*see p. 15*) and a "more realistic governmental policy on depreciation allowances," the average chemical company reports it will probably be unable to expand through the medium of retained earnings alone "for as far as we can see ahead."

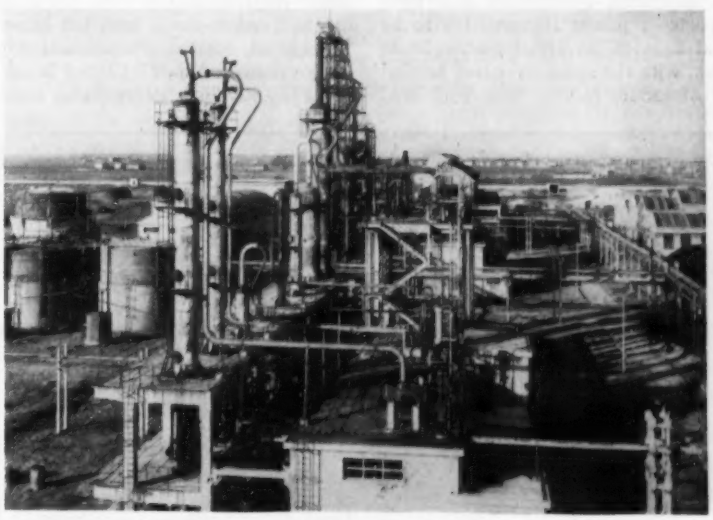
Joining the ranks of those who have bowed to the "compelling logic of long-term debt to accomplish its expansion purposes" last year was Allied Chemical & Dye Corp. Its $200-million debt issue last year was the largest corporate debt issue ever offered to the American public. And not long before, Union Carbide decided to borrow an even larger amount—$300 million—but from a group of institutional investors.

Those major publicly owned chemical companies still without debt by this week had dwindled to a scant half-dozen (*see box*); indications are that the roster may be even shorter before the end of the year.

A few companies point to fair-weather signs in Washington as "indications that equity financing may be reviving." Included: reduction in margin requirements on security credit; the more favorable attitude of the new administration toward business and even profits. But the consensus is that because of the very nature of its growth potential, the chemical industry can't escape the growing trend toward debt financing.

"It may be a few years before the total capital structure of our industry swings toward debt," offers one corporate treasurer, "but the movement in that direction is inevitable." There may be a few holdouts, but "most of us are converts now."

* Leverage is determined by the relationship between cost of debt funds (interest) or preferred dividends and the total amount of income available.



And More to Come

ITALIAN chemical exports are still rising. In shipments of fertilizers alone, tonnage has jumped 500% since 1951 (from 64,762 to over 334,000 tons). Main consumers now: Egypt, China, Austria, Portugal, Cyprus. And when the impact of Montecatini's new 50,000 ton/year nitrogen-from-methane plant is felt on the industry, Italians expect that worldwide export quotas will skyrocket.

LEGAL

Cross About Cracking: It seems that lots of anger is being generated these days about Houdry Process Corp.'s catalytic cracking process patents. Houdry's $22-million suit against Socony-Vacuum (*CW Newsletter, March 7, '53*) still is pending in U. S. District Court, Philadelphia; and now Houdry has started a suit against Richfield Oil Corp. in Delaware Superior Court, Wilmington, alleging that Richfield has refused to pay $145,685 royalty under certain supplemental licensing agreements. Houdry concedes that Richfield had paid in full the $1,125,000 due on its 1947 license covering a petroleum charging capacity of 9,000 bbl./day, but contends that Richfield has been in arrears on 1951 and 1953 payments.

Meanwhile, Socony-Vacuum has launched a counteraction against Houdry at Philadelphia. Socony is asking the court to enjoin Houdry from threatening Socony licensees with lawsuits charging patent infringement. In its original court move, Houdry had accused Socony of illegally selling licenses on the Houdry processes.

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Patent Law Conclave: Of interest to chemical company attorneys will be the Practising Law Institute's forum on industrial, commercial and legal aspects of patent licenses. It's to be held Feb. 27 in Hotel Statler, New York, with the speakers' panel headed by Alexander Neave, New York lawyer whose clients include Monsanto. The panel will consider business background, related inventions, royalty rates, tax and antitrust problems, and foreign licensing.

•

Saccharin Trademark: Monsanto Chemical Co., which won a similar civil suit last autumn, now has filed a complaint against Cosmos Chemical Corp., New York, charging that Cosmos has infringed the trademarks on Monsanto's saccharin containers. Monsanto is asking for an injunction against "counterfeiting or infringing" those trademarks; payment of all profits Cosmos made on the merchandise in question; an order that Cosmos destroy all unused "Monsanto" labels; and costs of the action.

In the earlier suit, the defendant Thoet Corp. agreed to stop using the Monsanto labels, which Thoet said were on the packages when it bought them.

•

Under Your Hat: A satisfied customer for 13 years, the Cleenz Chemical Co. of New York now is in court pressing a claim against Goodyear, charging that a quantity of 120-gauge Pliofilm turned out to be unsuitable for Cleenz' principal product, hat liners or covers. Cleenz says it had been buying the Goodyear plastic for that purpose since 1940, but that shipments received late in 1952 and early in 1953, when made into hat liners, "discolored, spotted, stained and otherwise damaged hats." Cleenz is asking $750,000 plus interest and costs.

TATA IRON & STEEL: Gets $20 million

Policy

Like a defenseman caught down-ice, India's infant chemical and pharmaceutical industry was rocked last week by a sudden reversal in government policy. The startling pronouncement: the Indian government, in the future, will not seek to enter chemical production "except in the interest of national security."

To those few independent chemical producers still active in India today the policy switch came as a bombshell. The squeeze on established private enterprise has been getting progressively worse in recent years as various government-sponsored plants have come onstream; there was every reason to believe that the pinch would be carried a step farther in 1954.

But instead, according to Indian Minister of Production Reddi, the government now feels it's ready to loan funds to private industrialists to expand existing chemical capacity or to undertake the building of new facilities.

Reason for the change-of-heart is probably twofold: production figures for the chemical industry in India last year show clearly that the country isn't utilizing its capacity as expected (*see table*); and there's been constant (though subdued) pressure from foreign investors insisting that the government "allow the natural advantages

PACIFIC AIR INDUSTRIES

Threat to Seclusion?

PALOS VERDES residents, upset over the plans of Great Lakes Carbon Corp. to mine diatomaceous earth in their strictly residential area (*CW, Jan. 6*) are still unimpressed by company offers to establish a residential development project on its newly acquired real estate. But the company isn't discouraged, is going ahead with elaborate plans to mask its quarry and keep it dust-free so as not to further antagonize its outraged Palos Verdes neighbors.

loan from government for expansion.

Change-over

of competition to get a foothold."

Regarding the failure of India's chemical industry to raise production up to capacity standards, the Chemical Manufacturers Assn. is adamant in its appraisal of where the fault lies: "Heavy imports of chemicals into India in 1953 caused an unreasonably competitive market. Producers were forced to cut down; the government as yet has made no move to protect private industry."

But this too Production Minister Reddi promises will be rectified shortly. "One of the government's first tasks this year," he says, "will be to take measures to curb the growing trade in spurious drugs and medicines in India and to enact legislation to eradicate unscrupulous dealings in chemicals."

Meanwhile, the government-owned Sindri fertilizer plant—largest single manufacturing unit in the country—continues to expand its facilities, is heading for a target production of 350,000 tons of ammonium sulfate annually. Accumulated stocks (reported last year at 80,000 tons) have been gradually dissipated; the company seems to have weathered the storm caused by financial difficulties of certain purchaser states and imperfect distribution arrangements.

Sindri itself is situated in the area served by the Damodar Valley Project, India's biggest multipurpose river harnessing scheme, and there have been indications in recent months that the government intended to make its fertilizer project the center of the country's chemical industry.

Minister Reddi, however, explains his government's participation in the project as an "undertaking essential to India's food self-sufficiency drive." Similarly the government's penicillin and DDT plants—now about to go into production with World Health Organization assistance—are justified on the grounds that these commodities must be made available to the public "as cheaply as possible."

As evidence of its desire to cooperate with private industry, the government points to the loan of $20 million to the Tata Iron and Steel Works at Jamshedpur in southern Bihar to expand facilities. Simultaneously, New Delhi is reported to be studying a report on a submitted project to double pig-iron production at the Steel Corp. of Bengal's plant—also with government-loaned funds.

As far as foreign loans are concerned, India's official position remains unchanged. "New foreign capital is welcomed as long as it aids, not hinders India's chemical industry." This, says Minister Reddi, has been the case since the government found industrial expansion beyond its own budget resources, and realized that "for the good of India, development of the chemical industry must not be retarded for lack of financial backing and technical know-how."

But private industrialists have yet to be convinced that the government has really decided to pull in its industrial horns. "We'd like to believe it," ventures one coke producer, "but we'll wait to see what happens over the next few months at Sindri."

Here's What the Indian Chemical Industry's Producing Today

Chemical	Capacity (tons)	Production (est.) (tons)
Sulfuric acid	189,000	93,800
Soda ash	54,000	51,860
Caustic soda	37,000	18,540
Chlorine	15,340	6,860
Bleaching powder	7,800	1,600
Superphosphates	192,660	33,240
Ammonium sulfates	426,850	306,640
Bichromates	5,900	2,150

URBAN LEAGUE'S THOMAS: For workers in South, equal opportunity.

Union on the Spot

Frequently the labor unions are on the rostrum plugging for fair employment practices, but in a current case involving alleged discrimination at a Southern chemical plant, it's the union that's on the spot.

Three Negro union members at the Shell Oil and Shell Chemical plants at Houston, Tex., are asking $1 million in actual and exemplary damages on grounds that Local 367, Oil Workers International Union (CIO), has failed to give the plaintiffs representation equal to that which it gives white members.

The National Urban League, which only last month held a meeting with officers of large corporations to discuss employment practices in the South, indicated it would send an investigator to the Shell site. Julius Thomas, the League's industrial relations director, says a similar conference with oil and petrochemical executives will be held Feb. 2 in New York. He avers that in a number of instances, unions have been helping to "perpetuate" the Negro problem in the South.

SPECTOR

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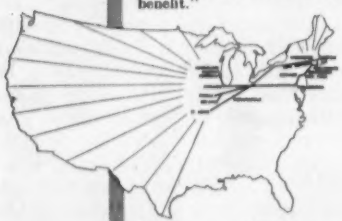

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LABOR

Sudden Slip: Three cents doesn't sound big in itself, but the recent 3¢ drop in average hourly wage rate in the chemical industries (reported in latest figures from the Bureau of Labor Statistics) was the biggest one-month decline in that rate since World War II.

From the all-time high of $1.87/hour as of last September, the chemical wage average slipped to $1.84 in October. The only larger drop during the past five years was a 3.7¢ lowering in 1949 that came by stages over three months.

In synthetic fiber plants and for makers of gum and wood chemicals, the dwindling last October amounted to 10¢/hour. Average wage of employees in synthetic rubber factories declined 7¢, and alkali and chlorine workers' pay rates were down by 5¢/hour.

•

Some Go Up: Despite that dip in the chemical industry's over-all wage pattern, many new chemical labor contracts are putting higher wages into pay envelopes. Among latest examples:

• For more than 2,000 employees of Merck & Co. at Rahway, N.J., and at Danville, Pa., there's a 6¢/hour general wage increase and the old 10¢ cost-of-living bonus has been frozen into base pay rates. For some 1,050 production and maintenance workers at three Sharp & Dohme plants in the Philadelphia area, it'll be an 8¢ increase and higher premium pay for overtime and holiday work. Both groups, represented by United Gas, Coke & Chemical Workers (CIO), had been on strike for seven weeks, finally accepted terms close to those that Merck and its S&D subsidiary had offered before the walkout.

• Continental Carbon has boosted wages by 8¢/hour for employees at its plants in Dumas, Tex., and Hobbs, N.M., who are represented by Oil Workers International Union (CIO); and Columbian Carbon has raised wages by 4¢ for AFL employees.

• Increases of up to 11½¢/hour are specified in new contracts signed with International Chemical Workers Union (AFL). Norwich Pharmacal is granting a 5% general increase and additional vacation benefits; S. B. Penick & Co. and its subsidiary New York Quinine & Chemical Works, 5¢/hour across the board; Trojan Powder Co., 9¢/hour and higher shift differentials; Monsanto Chemical, 11½¢/hour for employees at Seattle; Reilly Tar & Chemical, 7¢/hour for employees at Newark, N.J.; and Chemical Div. of General Tire & Rubber, 2½¢/hour and more vacation time.

•

Union Shop Tussle: Chemical companies that now have union-shop agreements and those whose employee bargaining units are asking for the union-shop clause are watching litigation that may lead to a U.S. Supreme Court ruling on whether the union shop is constitutional. At present, the issue is simply whether a railroad company may carry out the provisions of a union-shop contract in states that have so-called "right to work" laws; but the issue may broaden as the lawsuits roll along.

One such suit is now being tried in Amarillo, Tex., with the Atchison, Topeka & Santa Fe and 13 of its employees asking the court to ban union-shop agreements with 16 AFL unions. In a somewhat similar suit in Omaha last weekend, a judge held that the union shop is not legal under Nebraska law.

•

Joint Jurisdiction: Always eager to represent more chemical workers the Oil Workers International Union (CIO) is jubilant this week over its having been granted jurisdiction—as far as CIO is concerned—in the case of hourly paid employees at Texas City Chemicals, Inc., Texas City, Tex. OWIU started an organizing campaign at that plant several months ago, and the United Gas, Coke & Chemical Workers, also CIO, sent organizers to the scene somewhat later. The ruling by Nathan P. Feinsinger, official CIO arbitrator, signifies that both OWIU and Gas-Coke have jurisdictional rights in the chemical industry.

•

Leverage Tactics: How chemical labor unions work together to push wage rates upward is related in a recent letter from the business agent of Local 1, AFL Chemical Workers, to the president of Local 211. Both locals represent workers in the compressed gas industry; Local 1 is in Los Angeles, Local 211 in Pittsburgh.

"For years, the (Los Angeles) management has faced us with the fact that Local 1 had the best contract and wage rates in the entire industry," the letter runs. "This year, with your contract, we proved that you had gone ahead of us in your wage rates. As a result, we concluded a new contract with wage increases of 5% . . . Thanks for helping us . . . We hope you go ahead of us again next year, and give us a goal to shoot at."

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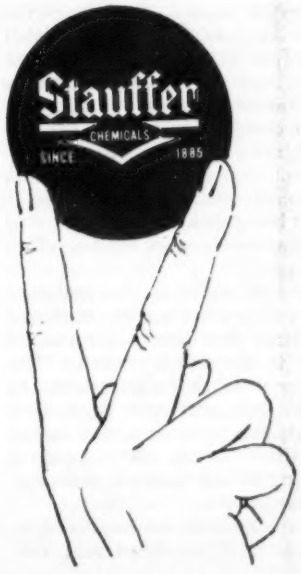

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ACME

Chemical industry, says Swisher's union, needs guaranteed annual wage to prevent layoffs that industry has to pay for anyway;

Enforced Full Employment: Worth a Try?

On the theory that pay lines are better than relief lines, one of the big labor unions in the chemical industry is talking up the "guaranteed annual wage," urging all its locals to seek GAW clauses in contracts to be negotiated this year.

That this could be a serious matter for chemical management was recognized in the talk by Industrial Relations Director Milton Olander of Owens-Illinois Glass Co. at the winter conference of the Manufacturing Chemists' Assn.: "It is not a problem to be shrugged off lightly with the comment 'impossible,' because pressure for it will continue as long as any substantial number of people feel threatened from day to day by layoff or discharge."

With economic seers predicting that unemployment may rise this year from the present level (about 2 million) to anywhere up to 5 million, and with employment of chemical production and maintenance workers edging down 1% to 510,000 in recent months, CW has surveyed 50 representative chemical and chemical process companies on how they're facing up to the GAW poser.

It's a Rarity: Foremost among the findings is that the guaranteed wage still doesn't have much of a foothold in this industry.* Of course, one large soap-making firm, Procter & Gamble, has pioneered with GAW, apparently has found a workable system for limited wage guarantees. But it's significant that this is a large company and that P&G found it had to develop a relatively steady sales program before it could set up its GAW plan.

Only one of the 50 companies surveyed has anything like a GAW plan in effect, and that actually should be excluded from the survey by definition, since the company's plan covers only salaried employees. Even in this case the guarantee is qualified: the company in question (young, small, so far successful) says that for its nine salaried employees, "within reasonable limits, their pay continues through vacations, ill health, etc."

This illustrates a point made by Olander—that no one's pay is truly "guaranteed" against all contingencies. Accordingly, he suggests that the CIO's argument in behalf of GAW is fallacious, being based on the concept of security "supposedly enjoyed by salaried people."

No Stampede: There's no sign of a rush toward GAW in the coming year, despite the stand taken by Elwood Swisher's United Gas, Coke & Chemical Workers (CIO) that "chemical workers need guaranteed annual pay." Not one of the companies surveyed has any intention to succumb to union demands on this point.

However, nearly one-third of the managements are studying the proposition, "just keeping informed." Their idea: to be prepared to give an understandable and convincing answer when and if the bargaining unit makes the request.

One convenient source of information for this purpose may be found in "The Economics of the Guaranteed Wage," a booklet published last fall by the Committee on Economic Policy of the U.S. Chamber of Commerce. That committee, chairmanned by National Cash Register Pres. Stanley Allyn, stresses that:

- "Substantial progress" has been made in ironing out seasonal unemployment.
- GAW, though practiced by a few firms for many years, still is not winning wide acceptance.
- Tied in with unemployment compensation, GAW benefits could be more attractive than wages, eliminate the incentive to work.

Ounce of Prevention: Even more widespread among the companies polled are measures to keep labor unions from bringing up this subject. For the most part, those measures are steps toward carrying out Olander's two recommendations: "First, do everything possible to stabilize employment by smoothing the work curve; and second, tell the people what is being done in the direction of providing steady work with resultant steady pay."

Typical of replies by chemical companies on this point was this statement by a large firm that has expanded rapidly in the past few years: "This (steadier work) has always been our aim. We will continue to try to level off production by any practical means, such as slack season sales campaigns, increasing storage facilities, and product diversification."

Other companies are increasing inventories at times, dovetailing tem-

* A 1953 report by the Dept. of Labor showed the GAW in effect at only five concerns in the chemical and allied industries.

WIDE WORLD

ACME

but all that workers really want is stable prosperity, not incentive for idleness, says Allyn's report for management.

porary operations to make continuous employment, assigning production workers to do upkeep and repair jobs during slack periods, closer coordination of production schedules and customers' requirements, and—in one case—"producing at reduced level throughout the year a product sold only during three months."

Hard to Avoid: Although these firms seem to be getting somewhere in their efforts to achieve intracompany job stability, nearly all of them report that they have come up against outside factors that are simply beyond their control.

Principal reasons listed for fluctuation of employment: seasonal demands, slow business among customers, seasonal production requirements, and changes in market due to introduction of new products and processes.

It can be argued that a chemical company can "do something" about some of those obstacles; for example, it may be possible to find new uses that will keep a given product in better demand throughout the year. The answer to that would appear to be that while management can order its researchers to look for new uses, there's no assurance that the quest will be successful.

Candid on Mistakes: Possibly in the belief that an honest confession is good for the soul, a few companies admitted that some past layoffs were more or less avoidable. For example, one company said its operation had been upset by lack of storage facilities, and another concern frankly stated that its 1946 layoff problem had been due to "poor management, which we hope not to repeat."

Other reasons cited for layoff troubles: imports, weather, technical changes, mechanical failures, business cycles, and termination of defense contracts. One company's industrial relations director put his finger on what has been a giant in its effect on employment patterns for the past 100 years: invention of ever more efficient labor-saving equipment.

Forty-four percent of the companies proudly asserted that they have had little or no worries about layoffs, that stable operating schedules were normal with them. "In effect," said one manager, "employment has been guaranteed."

Management Burden: So far, only four of the companies surveyed say they've been asked to adopt a GAW plan. In each instance, a CIO union was involved; one independent and two AFL unions also chimed in.

From the unions' point of view, GAW looks good as gold. As it was explained to Gas-Coke members, GAW "is an assurance that management will plan and direct the working force so that all employees can budget themselves on a yearly income basis."

While most managements now have a more "humane and enlightened" attitude than was ascribed to their predecessors, it's apparent that industry already has material as well as humanitarian incentives to accept the "responsibility of unemployment." These include public opinion, the desirability of attracting and keeping good workers (who would try to stay away from firms with bad layoff reputations), and state taxes for unemployment compensation.

There's no doubt that chemical companies want their people to enjoy steady employment. But as one employee relations manager phrased it, "If someone will guarantee to buy all of our products, then we can start thinking about guaranteeing employment."

Out of 50 Chemical Companies Polled on Guaranteed Annual Wage:

Number having GAW plan in effect	1*
Number planning to adopt GAW plans in 1954	0
Number investigating or considering GAW plans	14
GAW requested by employee groups	4
Number taking steps to forestall GAW demands	21

* For salaried employees only.

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PHILLIPS' FOSTER: For out-state natural gas users, a new lease on life.

Hope Renewed

The U. S. Supreme Court has exercised its prerogative and changed its mind in the Phillips case, which could have far-reaching effects on the structure of the natural gas and petrochemical industries.

Two months ago, the high court refused to review the decision of the Court of Appeals in Washington that the Federal Power Commission must regulate producing companies' sale of natural gas to interstate pipeline companies, even though the production and sale take place within a single state. Now the justices have reversed their November stand and are willing to hear the arguments.

Leading the legal group that wants state authorities to do the regulating is Rayburn Foster, vice-president and general counsel of Phillips Petroleum Co., who warns that "pipeline companies cannot exist for long if the producers' price for gas is regulated when sold to an interstate pipeline and is unregulated when sold elsewhere." (The "elsewhere" would include chemical and petrochemical plants located in the same state as the producer.)

FPC Happy: Besides giving renewed hope to Phillips and several thousand other firms that produce and gather natural gas, the Supreme Court's willingness to review the case is being welcomed by the FPC itself, also by the nine gas-producing states that had aligned themselves with Phillips in this suit.

Officials of the commission have been reluctant throughout to accept jurisdiction over producers' sales, and were particularly loath to be pushed into that job without legal "guideposts." FPC staff members are hoping that the Supreme Court hearing will establish "ground rules" if the Appeals Court ruling is upheld.

Phillips and the parties associated with it in this case say that if FPC gets jurisdiction over pipeline sales, the producers will sell more gas to local users, less to interstate customers, in order to avoid regulation. Also, Phillips told the court, producers would cut spending on exploration and drilling, resulting in fewer new discoveries.

FOREIGN . . . . .

Petrochemicals/Australia: A newcomer to the petrochemical field in Australia, Petroleum & Chemical Corp. (Australia) Ltd., has been formed to build and operate a high-temperature cracking plant in Sydney. Initial production (1956) will include crude benzene, toluene, xylene. Negotiations, company representatives say, are currently under way with the Gas Machinery Co., Cleveland, for the design, fabrication and the equipment that cannot be produced in Australia.

•

Fertilizer/Indonesia: The Indonesian government will get an assist in building its projected fertilizer plant in the coal mining area of southern Sumatra from six German chemists and engineers. The building's expected to take two years, at a cost of $2 million. Capacity: in excess of 150,000 tons of fertilizer annually.

At present, Indonesia is importing practically all its fertilizer requirements from Japan and the U.S.

•

Paper/Finland: Thanks to a $20 million loan from Russia, Finland may soon be soliciting bids from American firms to build new pulp and paper plants in Finland. There's no word yet as to how large the investment in increasing paper facilities will be, but local sources report the Finnish Government is officially backing the "substantial expansion of Finland's paper industry."

•

Iraq, U.S./Cooperation: Under a partnership agreement expected to be signed soon between the Iraq government and the Texas Gulf Sulphur Co., Iraq will take part in development of sulfur resources on an equal basis with the American company. Terms of the agreement include: permission

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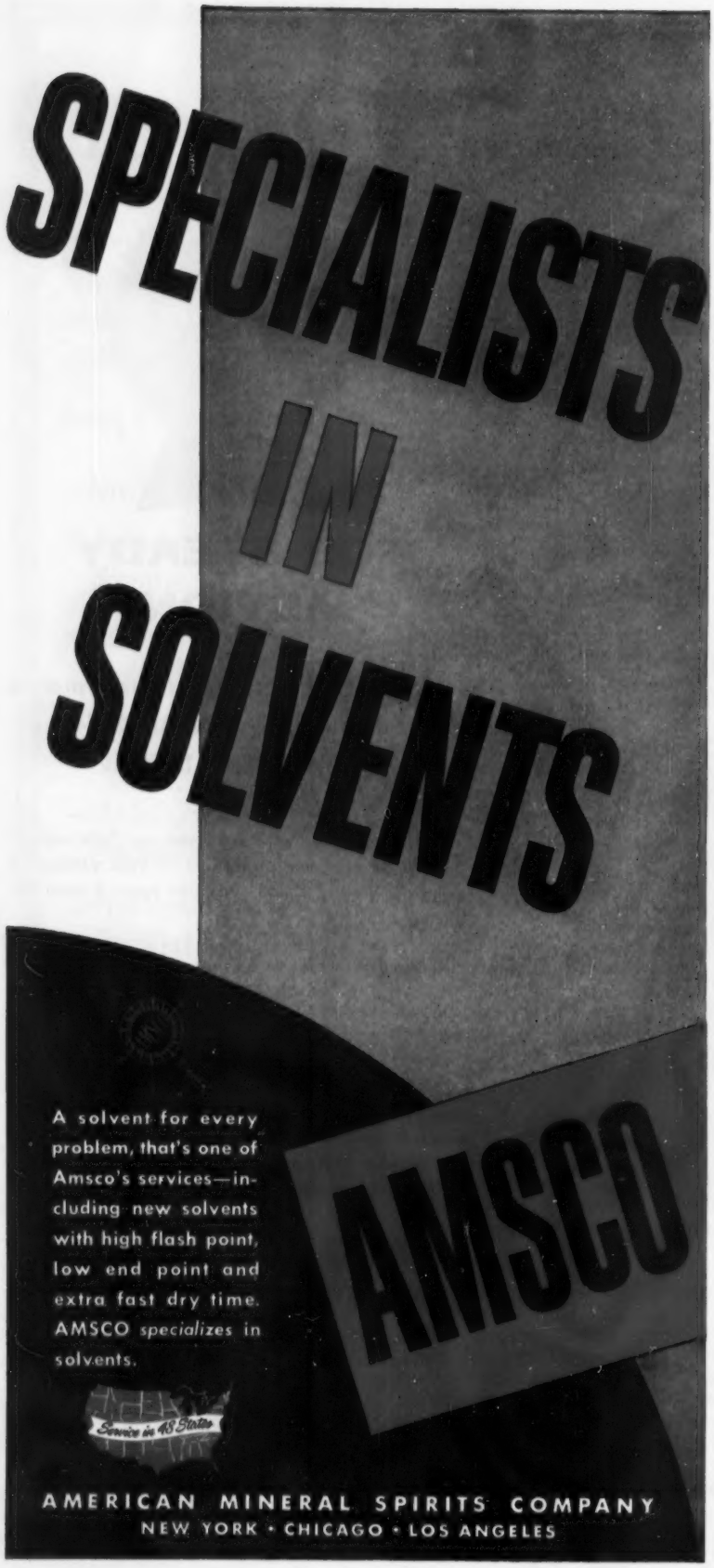
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to Texas Gulf to explore the entire country north of the 33rd parallel for a 50-year period.

While production's not expected for at least three years, sulfur field experts predict that from a plant at Kirkuk alone (cost, $60 million) Iraq can well count on 80-100,000 tons of sulfur annually. Other products anticipated: ammonium sulfate, carbon black, cement.

•

Chemical/Poland: Poland, in an effort to boost slipping agricultural output, has ordered its chemical industry to increase production of chemical fertilizers 35% over the next two years. The move followed official disclosure that agricultural output rose only 9% from 1950-1953—some 82% of its planned goal.

•

Natural Gas/Great Britain: Drilling will start within the next few weeks in the Cousland area, near Dalkeith, Scotland, in search of reserves of natural gas. It's all part of a plan, revealed by the British Gas Council last October, to spend $2.8 million over the next five years on large-scale exploration for natural gas to complement Britain's coal reserves—perhaps to lay the groundwork for fresh chemical expansion.

KEY CHANGES. .

David E. Pierce, to director of manufacturing control, Diamond Alkali Co., Cleveland.

M. E. Powers, to manager, Government Sales Dept., Wyandotte Chemical Corp., Wyandotte, Mich.

Raymond C. Firestone and **J. E. Trainer,** to executive vice-presidents, The Firestone Tire & Rubber Co., Akron.

W. L. Ulrich, to vice-president, The Carborundum Co., Niagara Falls.

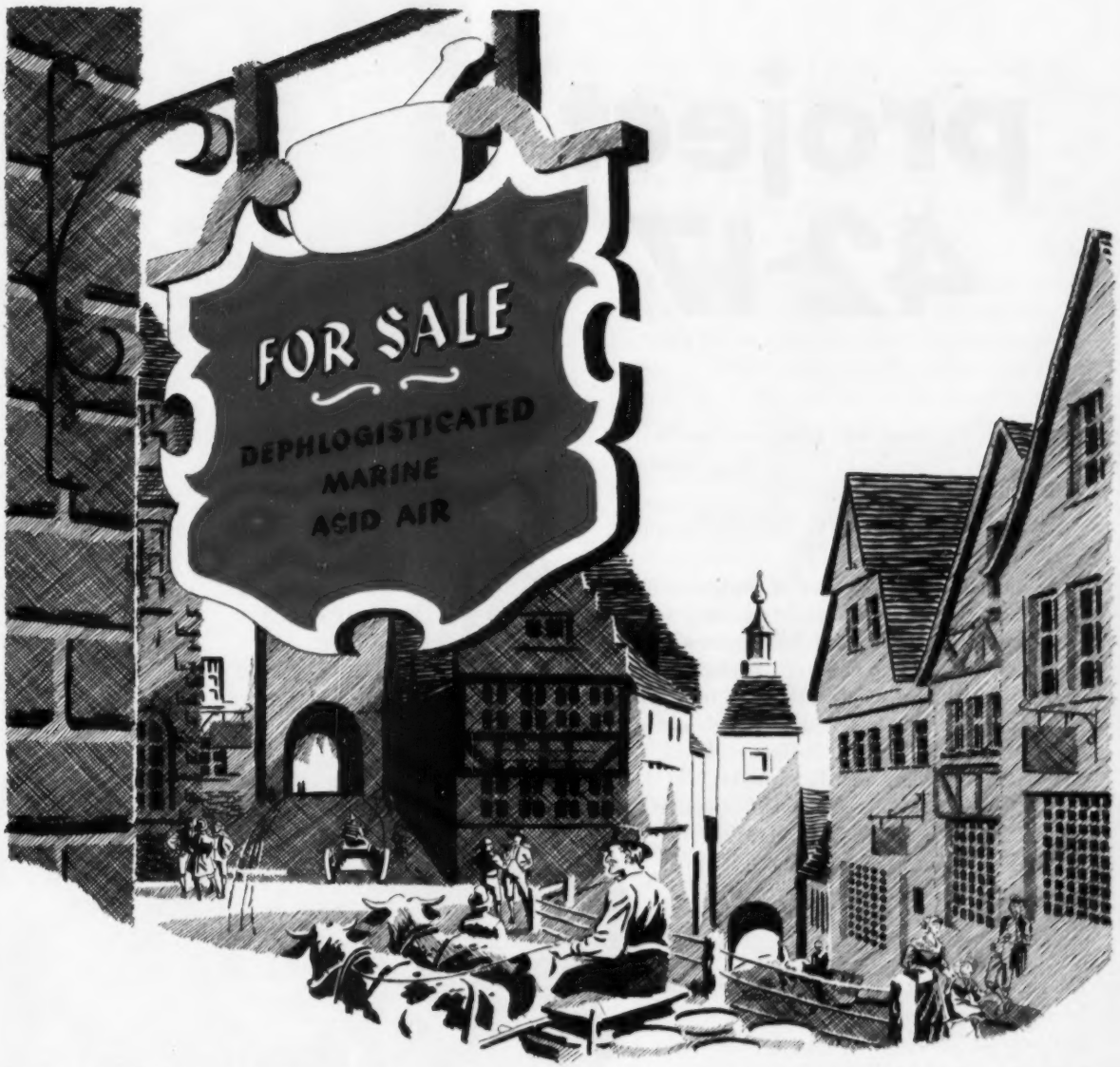
Fred W. Noechel, to manager, Textile Fibers Application Lab., National Aniline Div., Allied Chemical & Dye Corp., New York City.

James J. Flanagan, to director, Sun Chemical Corp., Long Island City.

James Beckett, to executive vice-president, Interchemical Corp., New York City.

Arthur F. Ratzer, to vice-president, Pyrene Manufacturing Co., Newark, N. J.

C. E. Lyon, to manager Chlorinated Products Div., Diamond Alkali Co., Cleveland.



If Karl Wilhelm Scheele, brilliant Swedish chemist and discoverer of Chlorine, had envisioned only a fragment of the importance of this chemical to mankind, he might well have hung such a sign outside his modest eighteenth century pharmacy.

Scheele made his discovery during his analysis of manganese dioxide. He named it "Dephlogisticated Marine Acid Air," because he was a believer in the phlogiston theory of chemistry. His find remained a laboratory curiosity for years, and its identity as Chlorine and its remarkable potentials were not realized until about 1810 when it was proved to be an element.

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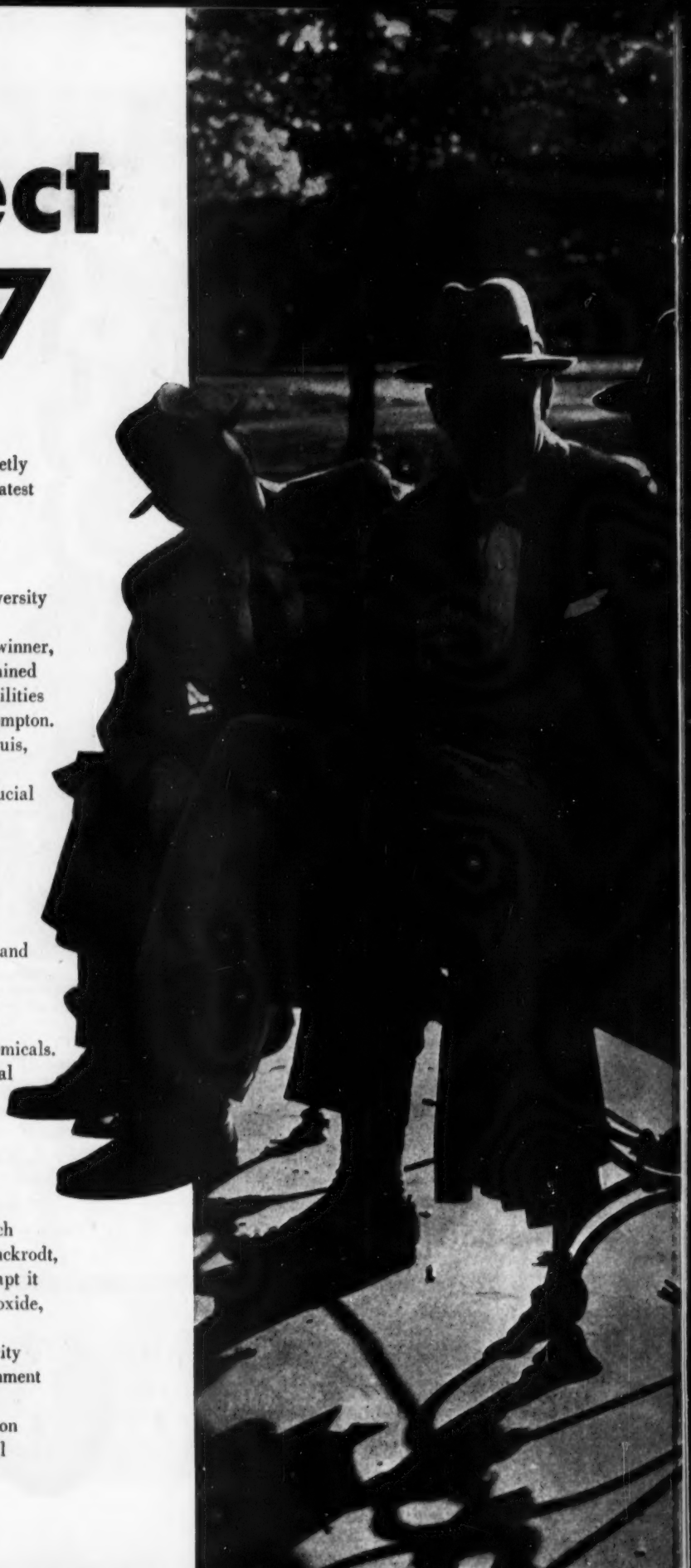
project 42-17

April 1942. Big things were being done quietly in those days. Shrouded in secrecy the greatest brain trust in history had undertaken to release the enormous energy of the atom for the defense of the free world.

Under the trees on the campus at the University of Chicago, three men sat quietly talking. One, an eminent physicist and Nobel prize-winner, was a leader of a group of scientists determined to marshal the nation's highest technical facilities for this purpose. His name: Arthur Holly Compton. He told his companions, just in from St. Louis, that he and his colleagues faced a problem of vital importance to the war effort. The crucial requirement was for pure uranium oxide, far purer than it had ever before been prepared except in test tubes. Moreover, his people would need tons of it, first for experimentation, later for its ultimate use.

The visitors from St. Louis, Henry V. Farr and John R. Ruhoff, were chemists from the Mallinckrodt Chemical Works, a firm with a long-established reputation for more than ordinary skill in the manufacture of fine chemicals. Edward Mallinckrodt had asked his technical managers to give his friend Compton whatever he wanted, if humanly possible.

Scientists working under the sponsorship of the N.D.R.C., Compton explained, had developed an ether extraction process for the purification of uranium nitrate which worked on a laboratory scale. Could Mallinckrodt, with long experience in handling ether, adapt it for use in tonnage production of uranium oxide, and achieve the necessary high purity? The specifications were rigid. Extreme purity was required. Time was short; but the assignment did not differ greatly from many others undertaken by Mallinckrodt chemists, also on a highly confidential basis, for the chemical and pharmaceutical industries.



Back in St. Louis, these men quietly, secretly put Mallinckrodt's technical organization to work. Less than 15 weeks later the primary problems of commercial production had been solved, a new plant had been designed, built, put into operation, and Dr. Compton's scientists were getting their uranium oxide.

After it was all over, the Smyth report recorded: *"Delivery started in July 1942 at a rate of 30 tons a month... it was a remarkable achievement to have developed and put into production on a scale of the order of one ton per day a process transforming grossly impure commercial oxide to oxide of a degree of purity seldom achieved even on a laboratory scale."*

By the fall of 1942, the need was for uranium metal—and lots of it. The Manhattan Project had been created, and a chain of supply had been set up in the country, starting with normally available uranium products and going on, through the oxide step, all the way to metal. DuPont, Harshaw, Electromet, Linde, Iowa State College and many other organizations had been working on various phases of uranium production. But still more output was needed. Some of these companies built new plants for oxide production. Mallinckrodt's operations were expanded to include uranium metal production. Technical information was freely exchanged among these cooperative groups, with the result that their combined production supplied the uranium needed for the atomic energy program.

V-J Day left us with a miraculous achievement, a great and threatening secret—and hope for a bright new future with atomic energy as a peacetime ally. But the job was still unfinished. To ensure an adequate supply of uranium, the United States must be able to process any uranium-containing raw material—domestic or imported, crude or refined—in the amounts needed. This meant the development of new processes, the designing of new equipment, and the construction of new plants. A challenging engineering problem loomed on the horizon.

With the war over, production of uranium metal was centralized, and it fell to Mallinckrodt to apply the accumulated experience, that of others as well as their own, to the development and integration of processes for producing pure metal from ores. Leading engineering and construction firms were called in. In cooperation with Mallinckrodt chemists and engineers, and under the sponsorship first of the Army, later of the Atomic Energy Commission, new facilities were designed and built by such firms as Singmaster & Breyer, Wigton-Abbott, Blaw-Knox and others—facilities that have since been operated continuously by Mallinckrodt at ever lower cost, and have been the prototypes for others subsequently built.

This is an important part of America's atomic energy story, *and the story of a Mallinckrodt assignment*—Project 42-17. Its significance to American industry is this: Mallinckrodt was given a tough job of critical importance—the job of supplying tonnages of highly purified materials, regularly, and at a reasonable cost. The job was done, on time, with superlative results. Much of the research and process development was a product of Mallinckrodt's own team, drawing whenever possible upon the experience of others engaged in similar problems. The engineering and construction became a joint enterprise which brought together a wealth of know-how and experience.

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Preparing plywood for plastic surfacing, observing fabricators' mixing methods help educate company salesmen . . .

School for Customers

This week, CW's camera went to school. Over in Elizabeth, N. J., the CW photographer snapped class pictures of Reichhold's reinforced plastics study sessions in action.

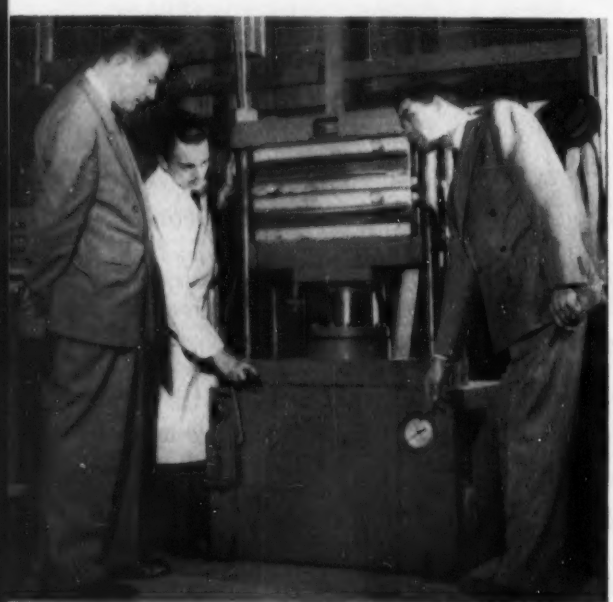
The Reichhold school was initiated recently when top management decided that their salesmen's education was not keeping pace with the company's expansion plans in the polyester field.

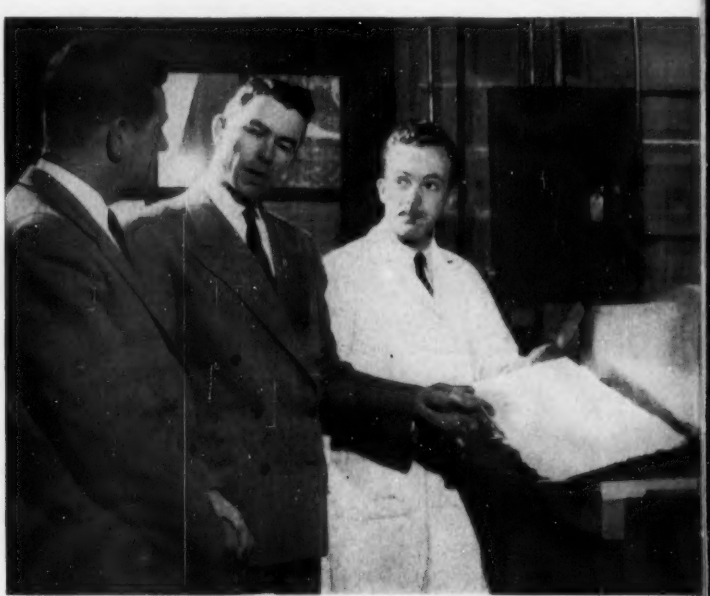
William Turner, who doubles as technical service representative during alternate-week off-session periods, conducts the week-long lecture and laboratory demonstrations. Original objectives, according to Turner:

- To enable the salesmen to understand the chemistry and application possibilities of polyester resins.
- To give them the "feel" of the resins by permitting actual handling of them in laboratory demonstrations.

Unforeseen Demand: Soon after the salesmen's classes began, however, its objectives expanded. Acting upon a customer's suggestion, the company is now inviting interested resin consumers to participate in the study sessions.

As Turner explains it, this increased scope stems





Handling of glass mat laminates on hot press impresses class with importance of proper working temperatures and resin content.

in uses of polyester resins and also introduce consumers' personnel to complexities of molded plastic production at Reichhold.

directly from two aspects of the burgeoning reinforced plastics industry:

- The large number of companies entering the field for the first time.
- The broadening variety of applications being boosted by operators already in business.

Stemming from these trends is the growth in number of production personnel who are unfamiliar with the complexities of polyester resins.

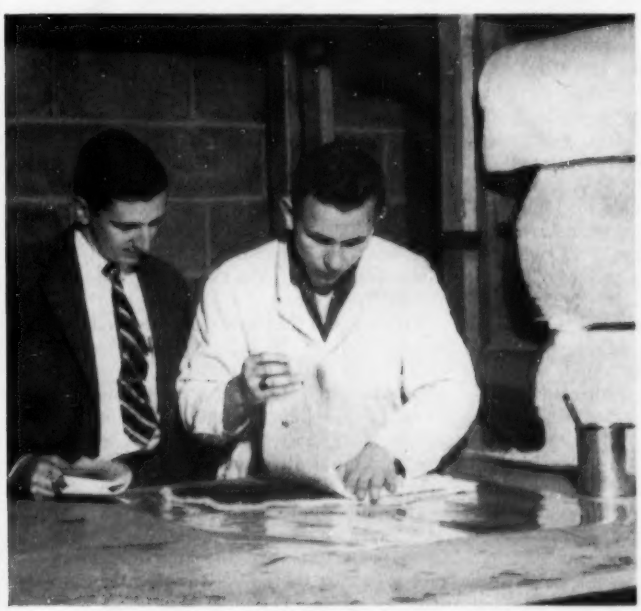
Although not originally beamed at customers, their inclusion, Turner admits, is probably leading to:

- More direct customer acquaintanceship with Reichhold's polyester resin line.
- An increased appreciation of the company's service in speeding the plastics education of the customer's operating heads.

Turner makes no claim that the training course will qualify its attenders as technical experts. The salesmen, he admits, will still need to fall back on the home team.

And as for the customers' men, they too, will need to perfect their operating techniques using their own company facilities.

More Later? The current sessions, according to Turner, will continue until Reichhold's entire sales force (now being taken two or three at a time) have attended, and until customer education is handled otherwise.



Discussion of glass-filled molding compounds and corrugated plastic sheets bears directly on big future sales outlet.

WE CAN LICK THE TOUGHEST AEROSOL PACKAGING PROBLEMS

★ As an example of the ability of Chemi-Form specialists, we just recently developed an Aerosol package for penetrating oil. This particular problem had never before been licked by Aerosol packaging. Now penetrating oil can be more successfully merchandised since the new package allows previously inaccessible places to be easily reached.

★ SPECIALISTS WORK FOR YOU

We have had wide experience in the performance of cans, valves, active ingredients, and propellents and have accumulated a great deal of data on formulations. Exhaustive laboratory work is done to eliminate the possibility of container or valve corrosion, of the materials hydrolyzing, and of side reactions occurring that usually result in corrosion of parts or build-up of unduly high pressures.

★ SMALL TEST RUNS AVAILABLE INEXPENSIVELY

When an assignment is given us to develop an Aerosol package we will cooperate with you in conducting a test run. This is done at low cost to demonstrate the effectiveness of the package and to give you an idea of the merchandising value.
If it can be put into an AEROSOL package we can do it.
Our assignments have given us experience with hard-to-package waxes, oils, and silicones. Also for critical compounds in drug, cosmetic, and chemical fields.
Complete compounding facilities available.

CHEMI-FORM CORPORATION
• Chemical Manufacturers • Formulators • Consultants
1631 SOUTH MICHIGAN AVE.
Harrison 7-6843
CHICAGO 16, ILL.

BIRTH OF A SYSTEM: Left to right, Sales Mgr. Bowling, Production Mgr. Gabelmann, Project Engineer Rowlan, thresh out a new project with Vice-Pres. Zinty.

Method at Magnus

Biggest news in the railroad industry these days is dieselization. Apart from major shifts in railroad operations and methods, this change means new problems, new opportunities to suppliers to the rails.

One of the chemical companies that stands to feel the effect of the dieselizing trend is Magnus Chemical Corp., Garwood, N.J. Magnus was originally a straight chemical supply house, but it was convinced a few years back that the huge railroad systems, with their extensive servicing operations, might prove to be good chemical customers, and it began a definite play for that business.

The Magnus selling approach, now applied to a variety of railroad operations, involves promoting a cleaning or servicing device as well as selling the chemicals required to operate it.

Magnus machines and chemicals are now cleaning diesel engine parts, stripping paint from cars, washing filters of all types, brushing and mopping insides and outsides of coaches.

The firm sells to other than railroads, but considers rails as special accounts. Its salesmen are carefully picked and groomed, seldom start with railroad servicing.

Al Bowling, equipment division sales manager, looks for a special kind of man for the big rail jobs. Besides knowing the art of selling and the Magnus line, the rail man, Bowling says, must be alert to railroad problems and, above all, not afraid to pitch in with shop gangs to lick the difficulties. This means plain, dirty, coverall, on-the-scene effort.

Sales v.p. Roy King terms Magnus' approach to selling the railroads as "method selling." Briefly, this means that Magnus engineers the complete job, including both chemicals and all necessary equipment. The company made its first sale to the Pennsylvania Railroad in this manner shortly after World War II—a decarbonizing compound plus cleaning machine to service diesel parts when an engine was torn down for a regular overhaul. The Magnus cleaner, together with a Magnus-designed agitator, was a "method" that proved faster and cheaper than the old hand-cleaning system.

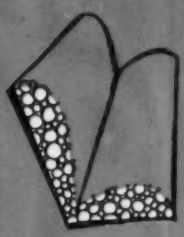
Of course, the actual route that finally leads to the sales goal—in this case it was recognition on the Pennsy approved list—is sometimes pretty devious. For selling to the rails, like much other industrial selling, takes one through the customer's back door as often as the front.

But nobody seems to mind if the Magnus man starts his pitch in the shop rather than in the purchasing office; in fact, there's usually no other way to introduce a new "method."

For instance, take a current main-

What can these MONSANTO ISOCYANATE applications do for you?

foams...



Monsanto isocyanates can be used to produce a wide variety of both rigid and flexible foams. Tolyene diisocyanate, for example, will give foamed-in-place resins which can fill the most intricate spaces without the usual labor necessary to form exact shapes to fit each cavity. RIGID FOAM applications: in aircraft industry, flotation equipment, thermal insulation, sound insulation and many other uses. FLEXIBLE FOAM applications (good performance at low density): transportation seating, mattresses, furniture, etc.

polyester rubber

Diisocyanates are a necessary ingredient for improving the processing of new, long-wearing synthetic rubbers such as Vulcollan. Several types of these diisocyanates are available for commercial use from Monsanto.

textiles...

Octadecyl isocyanate can be applied to give a highly effective and durable water repellent. Leather may also be treated with this same repellent.

herbicides...

Such compounds as phenyl isocyanate show high promise for use in the production of herbicides to prevent the growth of narrow leaf grasses in seed crops and also in new urea-type soil sterilants.

adhesives...

Monsanto isocyanates can be used to produce unusually high quality adhesives with high resistance to heat and hot water, and a wide range of applications. Already polyisocyanates have improved the bonding strength of rubber to synthetic fabric in automobile tires. They also have made possible the manufacture of polyurethanes for adhesives which give a remarkably strong bond in rigid materials.

polyurethanes...

The manufacture of these compounds is based on diisocyanates. In addition to adhesives they are being seriously evaluated for the production of surface coatings, dielectric films and sizings.

FOR COMPLETE INFORMATION MAIL COUPON TODAY

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SERVING INDUSTRY... WHICH SERVES MANKIND

MONSANTO CHEMICAL CO.
1700 So. Second Street
Inorganic Chemicals Div.
St. Louis 4, Missouri

Gentlemen:

Please send:

☐ Technical Bulletin No. P-125, "Isocyanates."

☐ Technical Bulletin No. P-145, "Isocyanates in the Adhesion of Rubber."

☐ Technical Bulletin No. P-151, Polyurethanes and Their Use as Adhesives.

Name..... *Title*.....

Company.....

Street.....

City..... *Zone*..... *State*.....

MAIL COUPON BELOW

The BETTER the ODOR the BIGGER the SALES!

...AND THE ODOR IS GONE!

The perfume chemist's skill in masking unpleasant odors, as applied to insecticide and disinfectant sprays has doubled and redoubled the spray maker's market by making these products pleasingly acceptable for household use . . . It might pay you to ponder the possibilities of using this same skill in the manufacture and merchandising of your company's products. But better still, mail the coupon and let us show you how.

PLEASE FILL IN AND MAIL

FRITZSCHE BROTHERS, Inc.
76 NINTH AVE., NEW YORK 11, N. Y.
We are interested in ☐ PERFUMES ☐ ODOR NEUTRALIZERS for use in the manufacture of products checked below. What do you recommend?

☐ FORMALDEHYDE ☐ ADHESIVES
☐ CLEANING COMPOUNDS ☐ INK
☐ FUEL OIL ☐ LUBRICATING OILS
☐ SPRAYS ☐ WAXES ☐ PLASTICS
☐ RUBBER ☐ LATEX ☐ LEATHER
☐ PAINTS or LACQUER ☐ TEXTILES
☐ ROOM or ☐ HOSPITAL DEODORANTS
☐ OTHER PRODUCTS: _____

COMPANY: _____
ADDRESS: _____
CITY: _____ STATE: _____
ATTENTION: _____
TITLE: _____

FRITZSCHE Brothers, Inc.
Established 1871
PORT AUTHORITY BUILDING
76 NINTH AVENUE, NEW YORK 11, N.Y.

TRYOUT: Bowling watches initial experiment in cleaning diesel filters.

tenance problem the firm is trying to solve for Pennsy. It all started when one of Magnus' special railroad service representatives learned through his shop contacts that cleaning and decarbonizing diesel electric generators is especially troublesome. And with PRR and other railroads rapidly converting to diesel locomotives, an improved method is urgently needed; and it could, if successful, lead to considerable additional business.

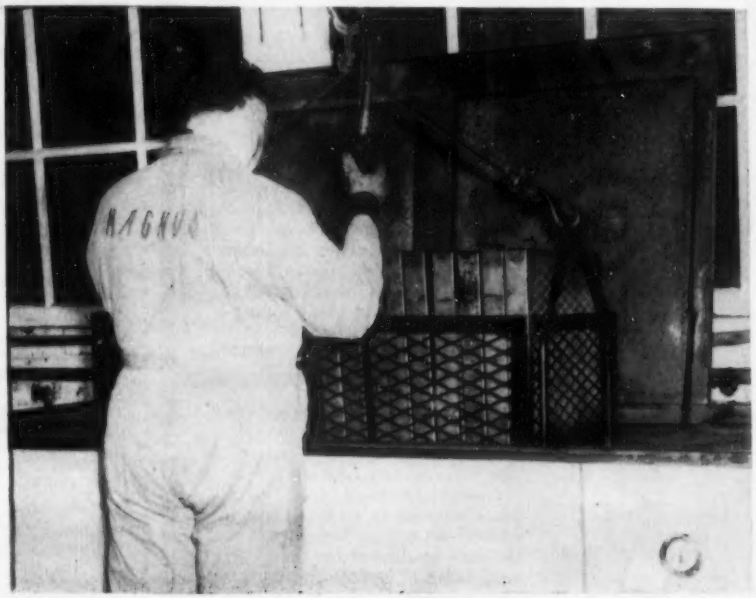
Briefly, the method now used requires tearing down the generator, cleaning, reassembling and, finally, an involved baking step.

Plan of Attack: Sensing a chemical application, the Magnus man asked his home laboratory for a solvent recommendation. Then, armed with solvent plus a Magnus-designed sprayer, he convinced a Pennsylvania superintendent that the possible saving in time and money warranted a test run. Then, assigned a heavily carbonized, gummed-up generator and a Pennsy man to work on it, he stood by to supervise the test.

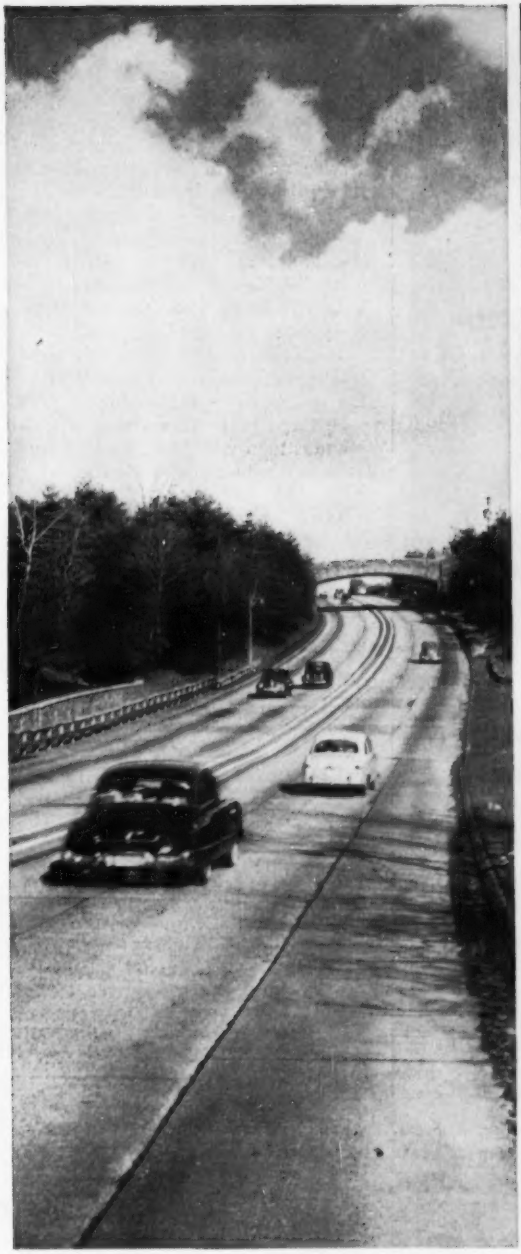
With the test run successfully passed, a sample of the solvent went to the railroad's Altoona test laboratories for checking against flash point, toxicity and other handling standards.

If and when Altoona approves, then the next phase will snap into action. A Magnus front-door salesman will put his story before Asst. Purchasing Agent Atkinson, in Pennsy's systems office, try to prove that the method will do a better job, cost less money. And Atkinson will no doubt insist upon some firm evidence before giving the go-ahead signal.

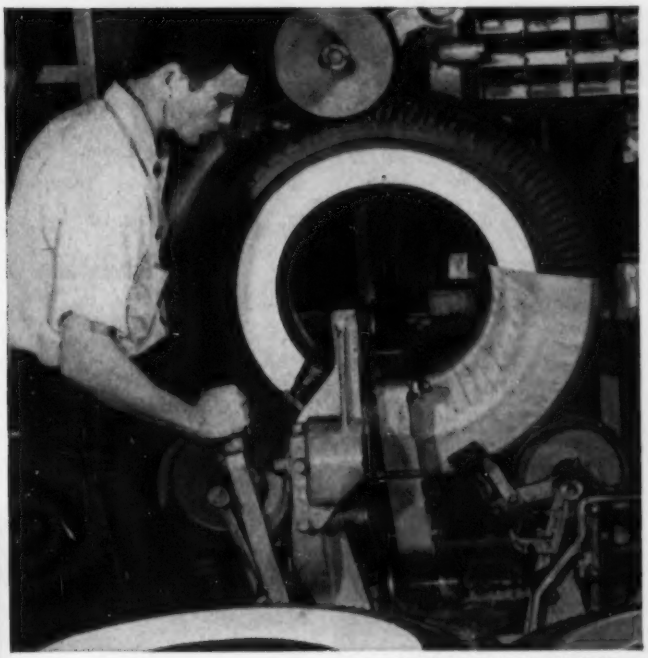
Should all go well, PRR will order



FOLLOW-UP: Service representative Ed Cadmus tests out applications for entire filter cleaning setup.



Motor Oil and Gasoline (Additives)



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To add the ingredients of success...specify

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34 successful years of leadership in serving industry

Get assured success—back your product with the research, experience and proved results of a pioneer leader. The Enjay Company not only supplies many different industries with a complete line of petrochemicals—Enjay also is ready to assist in the application of its products and in developing new or improved products to meet industry requirements. You can count on high quality Enjay chemical products—be sure to call Enjay for your chemical needs.

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PETROLEUM

PARANOX
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PARAFLOW
PARAPOID
PARADYNE
PARATAC
PETROHOL
Methyl Ethyl Ketone
Dewaxing Aid
Ethyl Ether
Isopropyl Ether
Reference Fuels

SURFACE COATING

PETROHOL 91
PETROHOL 95
PETROHOL 99
JAYSOL
Secondary Butyl Alcohol
Secondary Butyl Acetate
Isopropyl Acetate
Acetone
Methyl Ethyl Ketone
Ethyl Ether
Isopropyl Ether
Dicyclopentadiene
Naphthenic Acids
Iso-Octyl Alcohol
Decyl Alcohol
Denatured Ethyl Alcohol

CHEMICAL

PETROHOL 91
PETROHOL 95
PETROHOL 99
JAYSOL
Iso-Octyl Alcohol
Decyl Alcohol
Denatured Ethyl Alcohol
Tridecyl Alcohol
Dicyclopentadiene
Isoprene
Butadiene
Ethyl Ether
Isopropyl Ether
Tripropylene
Tetrapropylene
Aromatic Tars
Benzene
Acetone
Methyl Ethyl Ketone

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building bulk storage?

Investigate **TOTE** SYSTEM for **SAVINGS from 20% to 40%!**

These substantial savings *have actually been proved* by Tote System users over a period of years. For example, here are the comparative cost figures for one large bulk material handler:

Cost of Five Silos for Conventional Storage (complete with conveying equipment) ... **$350,000**

Cost of TOTE SYSTEM Equipment to Provide Same Capacity:

295 #A-110
TOTE Bins $125,000
Auxiliary Equipment 15,000
Hoists, etc. 10,000
Warehouse 45,000

Total .. $195,000

a SAVING of $155,000

... and that's only the **BEGINNING!**

TOTE...
FILL IT
TRANSPORT IT
DISCHARGE-WEIGH
BLEND IT
STORE IT

See our exhibit in Booth 654 at the National Plastics Exposition June 7-10, Public Auditorium, Cleveland, Ohio.

Tote and Tote System Reg. U.S. Pat. Off.

TOTE SYSTEM — built around easily handled aluminum bins plus automatic filling and discharging equipment — saves all along the line because it:

- **Speeds up weighing and blending operations, automatically and accurately**
- **Reduces labor and handling costs**
- **Eliminates product loss, contamination or deterioration**
- **Preserves original product quality**
- **Can be adapted readily to present or future plant layout**

Tote System is equally effective for inter-plant or in-plant handling of all types of bulk materials, including liquids. Products now handled by Tote System installations include among others, flour, sugar, salt, soap, detergents, cement, whiting, carbon black, powdered coffee, powdered plastics, fluorescent powders, ethocel, and polystyrenes.

Tote System engineers will survey YOUR plant to determine the savings YOU can effect — at no cost or obligation. Meanwhile, write for new illustrated literature packed with facts and pictures.

TOTE SYSTEM, INC.
820 So. 7th BEATRICE, NEBRASKA

DISTRIBUTION. . . .

about a month's supply for one of the diesel shops. But Magnus' selling operations, far from over, will shift back to the shop. A Magnus railroad service man will be "shipped" with the initial order. His job: to see that the shop foremen can duplicate the original experimental success, make certain the men use the process correctly, and above all, that they don't fight the method simply because it happens to be something new.

If there's no slip up to this point, and repeat orders start to roll in for the railroad's several shops, then, repeating past procedure, special Magnus men will go to work at each installation to make sure there's no final hitch.

Once the product proves itself, i.e., it's added to Pennsy's list, the Magnus force shifts its method-selling efforts to other roads. There'll be more talk and demonstrations, of course, but with a difference: when a big line like the Pennsylvania is satisfied with the new method, introducing the system to another road is bound to be a bit easier.

•

Purdue Packaging: Certain that no matter how much you know about packaging now there are still many new ideas of value, Purdue University has scheduled three sections of courses on topics of interest to help industry solve packaging headaches.

Labeled the Purdue Institute for Packaging Personnel, the classes will start Feb. 8 and continue through May, may be taken in two two-week periods with about six weeks between periods so that the time away from work will be staggered.

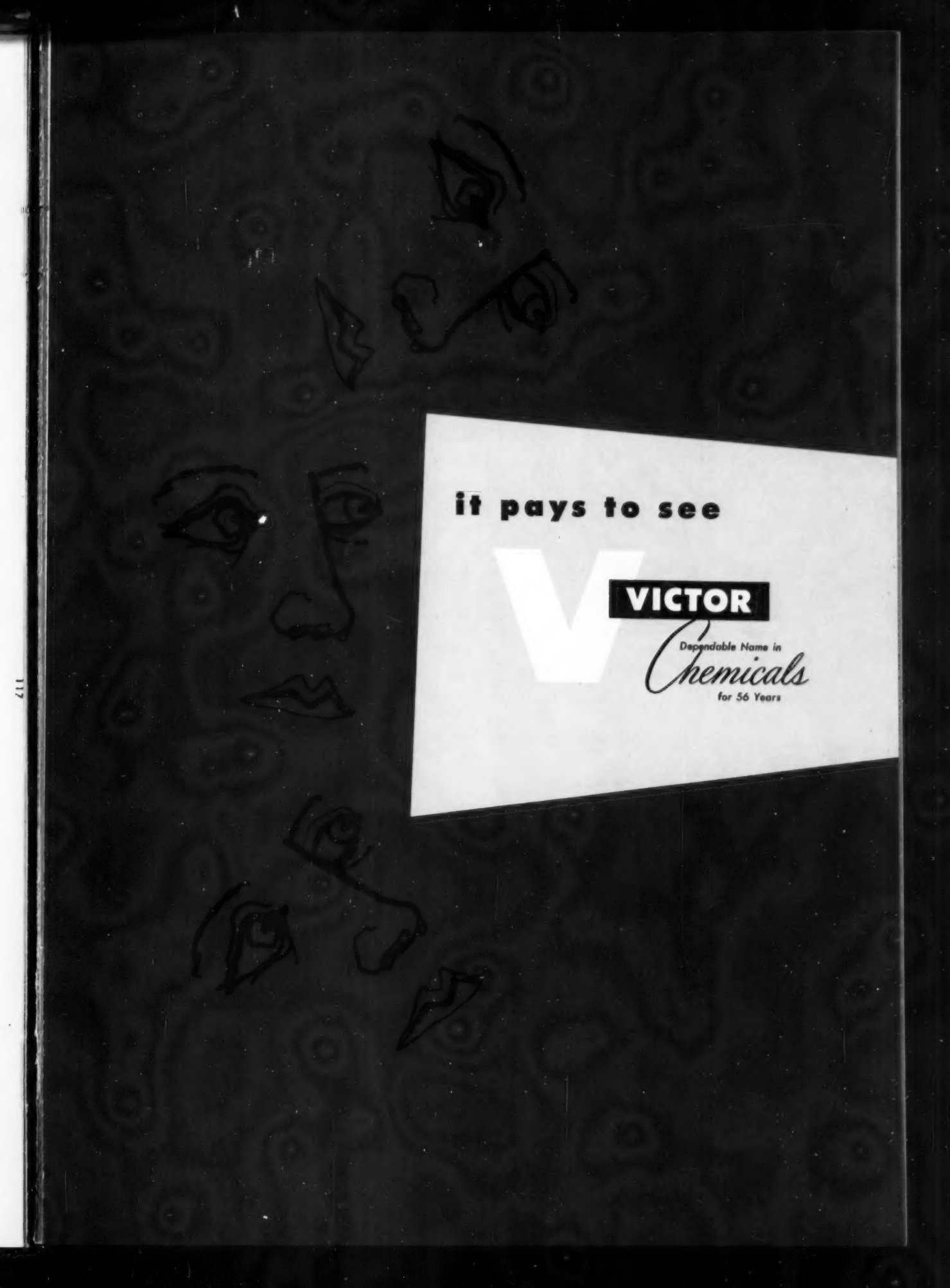
All phases of packaging will be discussed in each 160-hour course. Field trips have been lined up to demonstrate typical packaging research laboratories and industry packaging departments.

•

Marketing Course: The City College (New York) is offering a class in Applied Export Marketing of Drugs and Chemicals. Scheduled for evening sessions beginning Feb. 10, the course will cover marketing techniques in the process and pharmaceutical industries both here and abroad.

•

Drug Outlets Only: Lakeside Laboratories, Inc. (Milwaukee) has completed a five-year transition program establishing distribution through wholesale and retail drug sources exclusively. The pharmaceutical firm, no longer selling directly to physicians, is turning over all orders to local drug outlets.

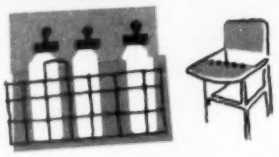

it pays to see
V
VICTOR
Dependable Name in
Chemicals
for 56 Years

Na_2HPO_4

DISODIUM PHOSPHATE, DUOHYDRATE

Anhydrous disodium phosphate is a white, crystalline material of food grade purity. Also available, disodium phosphate duohydrate, a white, crystalline material which complies with Food and Drug Laws in purity.

USES: Boiler water treatment. Tin weighting of silk. Textile process waters. Buffer in dye-baths. Casein emulsifier. Processing of cheese. Manufacture of pharmaceuticals, and evaporated milk. Pumping pickle for canned meats.



A Phosphate Makes the Difference

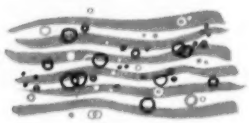
A baby's appetite demands only one food . . . milk. As a substitute for mother's milk, many doctors recommend a formula based on evaporated milk. The creamy, uniform quality of evaporated milk is made possible with the use of an emulsifier, disodium phosphate. Victor is proud to produce this phosphate that meets the high purity and uniform quality standards required by the industry. Disodium phosphate also finds wide application in the production of process cheese. It pays to see Victor.

$(NaPO_3)_n$

SODIUM TRIPOLYPHOSPHATE

Sodium tripolyphosphate anhydrous, powdered or granular.

USES: Soap builder. Manufacture of detergents and water softeners. Purification of china clay. Conditioning oil drilling muds. Particularly effective in bar soaps; will not crystallize nor bloom. Disperses soap curds in hard water and eliminates scum. Clay dispersant. Deflocculant in raw cement slurries. Anti-pitch agent in paper making.



A Clean Story

Combine soap and hard water and you are asking for *trouble!* Soap plus hard water produces insoluble curds. These curds cause "tattle-tale gray" and in time they tend to "gum up" washing machines. Victor is proud of the important role that its phosphates have played in the development and growth of detergents. Victor sodium tripolyphosphate and tetrasodium pyrophosphate are well known by builders of detergents for their ability to produce a sweeter, cleaner, whiter wash. It pays to see Victor.

Take-Hold

PLANT FOOD COMPOUND

Take-Hold® is a combination of pure, crystalline ammonium and potassium phosphates, completely soluble in water, giving a substantially neutral solution.

Typical analysis: N 10%
P_2O_5 52%
K_2O 17%

USES: Starter solution and plant food for tomatoes, tobacco, cabbage, eggplants, floral plants, etc. Produces earlier fruiting and larger yields.

How to Get a Head Start

With home gardeners the motive is pride! With commercial growers, it's profit. But both delight in harvesting a bumper crop ahead of competition. And both accomplish this objective when they use Victor's "Take-Hold" . . . the special plant food that produces a head of cabbage fast and speeds early yields of tomatoes, cauliflower and other crops grown from transplants. Take-Hold is widely used by both commercial and amateur gardeners for faster growth, greater yield, fewer plant losses. It pays to see Victor.

$Na_2H_2P_2O_7$

SODIUM ACID PYROPHOSPHATE

TRADE MARKS — Victor Cream, Perfection, B. P. Pyro

Victor sodium acid pyrophosphates are white powders whose purity meets the requirements of the Federal and State Pure Food Laws.

USES: Baking acid for doughnut flours, prepared flours. Manufacture of commercial baking powders, and baking creams. Conditioning oil well drilling muds. Acid type metal cleaner.

Here's Mud in your Oil Well

Custom-made mud for oil well drilling is almost worth its weight in gold. The mud washes the hole clear of cuttings and returns them to the top. It builds a protective wall against the side of the hole to guard against cave-ins and holds back gas pressures. To control mud viscosity, Victor sodium phosphates are added as needed. The oil industry is another field where Victor chemicals fill a need. It pays to see Victor.

$POCl_3$

PHOSPHORUS OXYCHLORIDE

Phosphorus oxychloride is a water-white to slightly yellow liquid whose vapors are very irritating. It decomposes in water to yield phosphoric and hydrochloric acids, and is chemically very reactive.

USES: Intermediate in production of organic chemicals. Chlorinating agent. Catalyst.

From Phosphates to Pharmaceuticals

Phosphates have played an important role in the synthesis of many of the modern "miracle" drugs used today. For example, phosphorus oxychloride acts as an intermediate in the production of sulfa drugs and in the synthesis of atabrine, the anti-malarial specific. Two other Victor products play important roles in modern medicine development . . . phosphoric acid in the production of new "allergy" drugs.

$CaH_4(PO_4)_2$

MONOCALCIUM PHOSPHATE, ANHYDROUS (Heat-treated)

TRADE MARK—V-90®

(U. S. Patents 2160700 and 2160232; Canadian Patents 388809 and 388810)

V-90 is a fine, white, free-flowing powder, each particle of which has a thin, continuous coating of a relatively insoluble phosphate which delays solution when aqueous liquids are added. This makes possible a delayed leavening action.

USES: Manufacture of self-rising flour, self-rising corn meal, pancake flour, prepared mixes, household baking powder, phosphated plain flour, and bakers' angel food cakes. As an ingredient of baking preparations. (U. S. Patents 2160700-1 and 2160232-3)

Light as a Bride's Biscuits?

In the South, especially, even a bride's biscuits are almost certain to be feather-light and tender. This is because most southern folks buy their flour with salt and special baking powder already mixed in by the miller. One of the ingredients is Victor's V-90 phosphate . . . the world's only slow acting monocalcium phosphate.

VICTOR

Dependable Name in Chemicals

for 56 Years

Phos-H

PHOSPHORIC ACID

Phosphoric acid is a clear, colorless, sparkling liquid. All grades meet the requirements of the Federal and State Pure Food Laws.

Concentrations: 75%, 80%, 85% N.F.
115% (Polyphosphoric)

USES: Manufacture of yeast, sugar, soft drinks, imitation jellies, gelatin, and pharmaceuticals. Rustproofing, engraving, railroad car cleaning, refining oil and gasoline, preserving silage. Weighting silk, and dyeing textiles. Chemical polishing and electro-polishing metals, bright-dip baths for aluminum. Manufacture of phosphates, dental cements, glue, ceramics, glass, metal treating compounds, explosives, and fertilizers.

One Bath Lasts a Lifetime

The beauty and durability of metal products such as refrigerator shells, automobile bodies and the like, is due in part to a phosphoric acid bath given the metal just before paint is applied. This bath produces a rust-resistant coating on the shell that provides a better bond for the paint. Thus, blistering and chipping, due to an improperly prepared surface, is avoided. For years Victor has been the principal supplier of phosphoric acid to the metal industry. It pays to see Victor.

Fyrex

FLAMEPROOFING COMPOUNDS

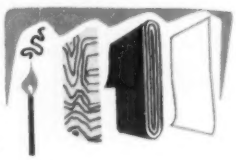
TRADE MARKS

Fyrex®—a neutral ammonium phosphate.

Flexible Fyrex®—regular Fyrex to which a softening agent has been added.

Special Flexible Fyrex®—regular Fyrex to which a softening agent has been added, plus a penetrating agent.

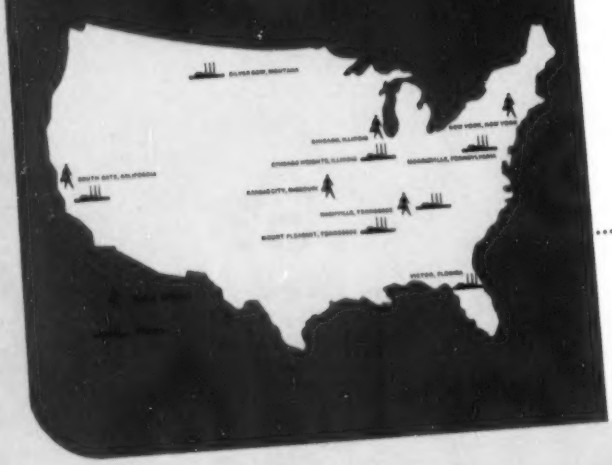
USES: Flameproofing of textiles, paper, wood, and vegetable fibers. Applied to paper, fabrics, or insulating materials by dipping, spraying, or contact rollers; to wood under pressure in autoclaves.



Burning Question

Ammonium phosphates are among the most effective flameproofing agents known. Victor ammonium phosphates, as well as special compounds like the Fyrex Group and Victamide®, have found wide use in industry. Alert manufacturers seeking a new sales appeal for their products have found that flameproofing them with Victor's flameproofing agents turned the trick. Materials for insulation, paper, wood, and textile products are among the many items that lend themselves to flameproofing. It pays to see Victor.

plants and offices of VICTOR CHEMICALS



it pays to see

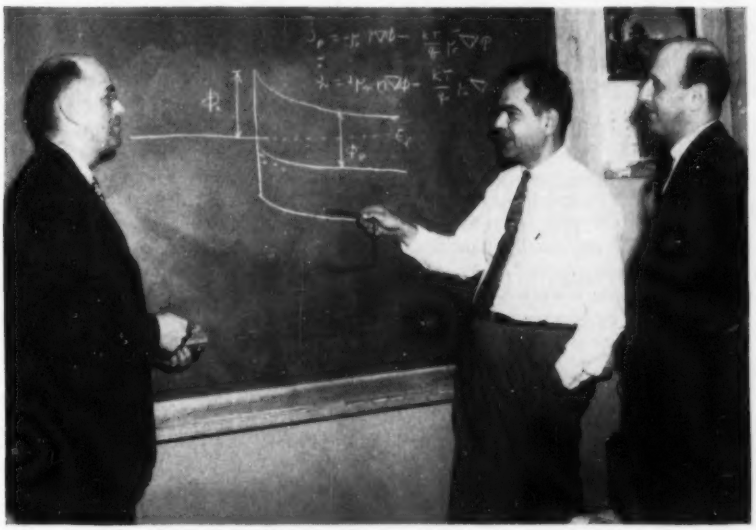
VICTOR

Dependable Name in Chemicals for 56 Years

VICTOR CHEMICAL WORKS

141 West Jackson Boulevard

Chicago 4, Illinois



SILICON CAREER CARVERS:* Needed, hot spots for high resistivity.

Premium for Purity

Silicon is spotlighted by the newest results of Philco Corp.'s fast-stepping transistor research program.

Using a highly pure Du Pont-supplied silicon, Philco has developed a transistor that substantially boosts the temperature ceiling on the operation of such devices.

The silicon transistor, unlike its germanium forerunner, could be used in jet aircraft, guided missiles, etc. Still in research, it's being eyed by other firms as well.

The control staff of Du Pont's Newport (Del.) pigments department plant may well wonder whether the company's silicon customers aren't carrying their purity demands too far. A small Newport pilot unit regularly turns out silicon tainted with less than one part per 100 million of impurity—but electronics researchers who are now carving a market for the material still clamor for improvement.

It's more than whim on their part; super-purity is the key to a promising new career for semiconducting silicon. Several industrial firms are now eagerly trying that key in the door of the electronics industry. First to report a measure of success in his company's development efforts is David Smith, vice-president of Philco Corp. research.

Philco has just reported "the attainment of useful transistor action with silicon," believes that this is "the first time" that such action has been obtained with silicon.

For all practical purposes, Philco's silicon transistor is still in the laboratory stage of development. But it isn't difficult to spot a commercial niche for the device in electronic equipment subject to high temperatures. Germanium, currently enjoying a corner on transistor production, loses its semiconducting properties at relatively low temperatures.

Taking over for vacuum tubes, tiny transistors of germanium are fine for electronic computers, hearing aids, communication equipment, etc. Where operating temperatures above 212 F are encountered, however, germanium is virtually useless. It's here that silicon has its best chance. Silicon retains its transistor qualities up to at least 400 F, might go into jet aircraft, guided missiles, electric motors, and other select "hot spots." It also is able to handle several times as much power as germanium.

No Secret: Although the first to tip its hand, Philco hasn't caught the competition napping with its silicon revelation. All major electronics research organizations have silicon probes under way.

Unlike Philco (which is interested in transistors chiefly as amplifiers), General Electric and Westinghouse are also eyeing compact, high-capacity silicon-transistor rectifiers. In this capacity, silicon would compete with selenium. Sylvania, RCA and Bell Telephone Laboratories, too, are very much aware of what silicon can do, have had the element under scrutiny for quite some time and are still pushing research.

Not every company shares Philco's enthusiasm for the new semiconductor. Most agree that silicon does have a place in high-temperature applications, but the consensus is that it will never put germanium completely out of a job. For one thing, germanium (in its temperature range) is a better semiconductor; it's also less costly.

But silicon's high selling price—$430/lb.—isn't its most serious handicap; enough for a transistor wafer costs only 2 to 4¢. An abundant, high-purity supply is the main obstacle to quick commercialization.

The element's resistivity (the most important criterion of quality for transistor use) is sharply reduced by certain impurities. For all practical purposes, transistor makers don't need the extra-high resistivity of absolutely pure silicon. As a matter of fact, silicon crystals used in transistor preparation are "doped" to make them better conductors. But accidental contaminants are almost never the desirable ones. So, you must start with the purest material possible.

Out in Front: Du Pont, the only company that was able to bring the highly pure silicon down to its present cost, won't make a flat statement on the purity of its product. So free of contaminants that ordinary spectroscopic and analytical techniques are of little use, the Du Pont material is assayed by its electrical characteristics. About all that can be said with any assurance is that impurities are spoken of in parts per 100 or more million. The only serious, though harmless, exception is a fairly high zinc content. Boron, however, sometimes causes trouble.

From a small pilot operation at Newport, the company turns out the near-immaculate silicon as a brittle, gray, coarse polycrystalline substance. Before it can be used to make transistors, the silicon is melted (boiling off the zinc), "doped" with traces of

* (L. to r.) Philco's research leaders William Bradley; Vice-President Smith; and Donald Fink.

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certain desirable elements and converted to massive form. Single crystal ingots, necessary for subsequent processing, may be prepared from the melt. These are made into transistors by point-contact, alloy-junction, or newly developed surface-barrier techniques.

Aside from Du Pont there are two others in the pure silicon picture. Sponsored by the government, Foote Mineral Co. (Philadelphia) has done a good deal of process research, is, in fact, supplying small quantities of the pure element to Army Signal Corps electronic scientists. Foote gets its product by decomposing silicon tetrachloride on a hot wire, in much the same way it produces pure zirconium. Sylvania's Tungsten and Chemical Div. also admits to making the pure element (for captive consumption) from silicon tetrachloride.

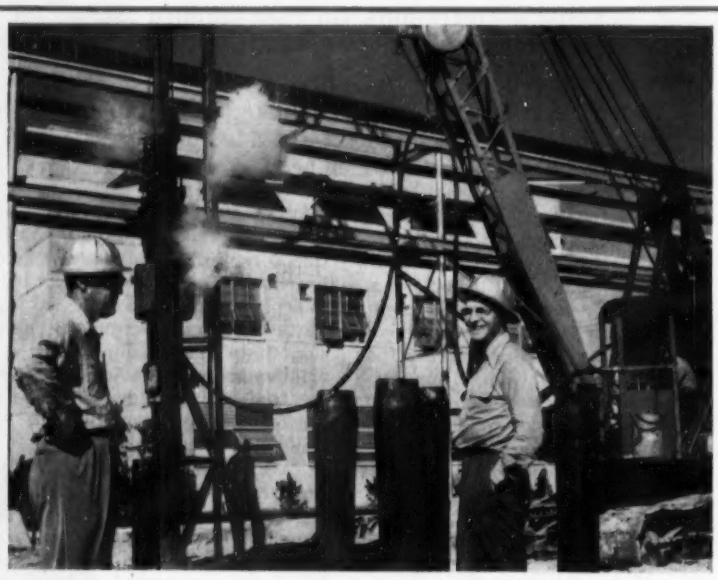
Du Pont, on the other hand, is absolutely mum on all process details. But there's little doubt that processwise Du Pont is out in front. Potential competitors haven't come close to matching the Du Pont price, are—in Foote's case, at any rate—pushing research on high-purity silicon at the request of the government.

That situation, however, does not apply across the board where silicon is concerned. Sylvania has long been a producer of electronic silicon, claims the distinction of having been the largest supplier of silicon diodes during World War II.

Silicon availability, however, is still an important question for the government and potential consumers of the extra-pure product. At this stage, production is limited to research requirements for the element in electronics. But in the long run, an adequate supply seems assured. Du Pont states that its closely guarded process "has opened up a virtually unlimited source of the material."

The electronics industry is understandably concerned about a firm foundation of availability for its silicon transistor plans. The government would like to have more than one producer of a new material with obvious military value.

Headed for a promising commercial career, silicon still has considerable charm for research and development people. In addition to posing a continuing chemical process challenge, the element highlights the intriguing possibility of discovering additional new semiconductors among its periodic table relatives.



In on the Ground Floor

SLIGHTLY out of his element, helmeted Herbert Morris (*right*), associate research director of Monsanto's plastics division, is a sidewalk superintendent at the recent ground-breaking for the company's new Texas City research building. To supplement the division's existing plastics research facilities, the structure's 12,440 sq. ft. will be apportioned between 16 laboratories, an office wing, and an auditorium. Morris' companion: Richard Dunlop, division executive.

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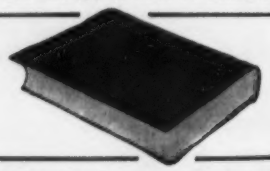

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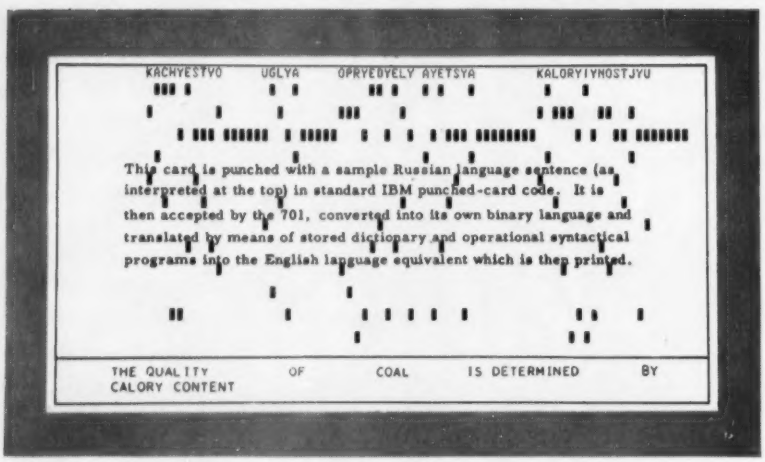
IBM'S WATSON (right) AND FRIENDS:† For a mathematical wizard . . .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Polyglot Brainchild

On a crisp New York morning recently, an International Business Machines operator settled herself before the keyboard of a hulking machine, flexed her fingers once or twice, and rattled off: "Mi pyeryedayem mislyi posryedstvom ryechyi." In a twinkling the machine's automatic printer chattered back: "We transmit thoughts by means of speech"—and for the first time an electronic "brain" had successfully translated Russian into English.

To prove that it was no accident, the "brain" proceeded to make short work of: "Vyelyichyina ugla opryedyelyayetsya otnoshyenyiyem dlyini dugi k radyiusu,"* and more than 60 subsequent Soviet jawbreakers.

Significance of the event to scientific research cannot be overestimated. So far as the "brain" is concerned, any one of a number of languages could have been substituted for Russian. Eventually, it should be possible to translate reams of current foreign research literature in little more time than it takes to punch holes in IBM cards.

A joint effort of IBM and Georgetown University's Institute of Languages and Linguistics, the convincing demonstration in IBM's midtown New York headquarters capped more than a decade of independent research by a scattered handful of men.

In a way, it was a personal triumph for IBM's big 701—called the most

* "Magnitude of angle is determined by the relation of length of arc to radius."

† Cuthbert Hurd (*left*), director of IBM's applied science division; Georgetown's Dostert.

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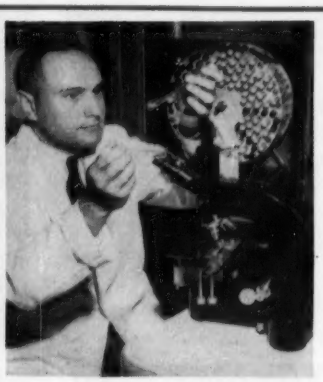
versatile calculator in existence. Interrupted in its regular 16-hour-a-day schedule of solving nuclear equations, calculating rocket trajectories, etc., the mathematical wizard hummed through the linguistic chore in quick time. Before the approving eyes of IBM chairman Thomas Watson and a flock of spectators, it spelled out its cryptic monologue at the tongue-twisting rate of two and a half lines per second.

According to the company, what the precocious 701 actually did, in executing the Russian-English translation, was to create within itself a working model of a "brain" specially designed to handle logic.

Asserted happy Georgetown scholar Leon Dostert, who conceived the rewarding electronic translation idea: "Those in charge of this experiment now consider that . . . electronic language translation is feasible." Said a proud IBM publicity man: "The 'brain' . . . has produced its own brainchild."



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SEARCHING for an elusive by-product of early penicillin manufacture, George Washington University researcher Ivor Cornman—shown here examining tissue cultures—is pioneering a hopeful new area of cancer research. Object of Cornman's quest is an unknown chemical that proved able (in the test tube) to kill cancer cells, yet leave normal tissue apparently unharmed. The anticancer factor, a by-product of 1943 and 1944 batches of the antibiotic, was lost as penicillin production methods improved. Schenley Laboratories, American Cancer Society and National Cancer Institute are sponsoring efforts to trace its identity.

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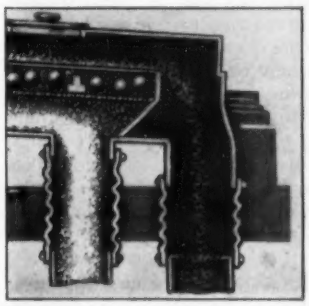

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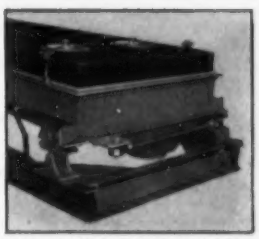

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RESEARCH . . . . . .

Outside Opinion: A novel twist in commercial consulting practice is Truesdail Laboratories' newly formed research advisory board. Made up of five prominent academic scientists (four chemists, one medical man), the board will be called upon for guidance in the organization and execution of sponsored research projects. Members are paid a regular monthly fee for their services, won't be asked to aid projects that conflict with standing consulting commitments.

"This is a new concept in commercial laboratory practice," avers Truesdail. "While some testing laboratories in the past called on specialists outside the firm," it recalls, "they have never been organized into a formal panel and paid a retainer."

•

For Fat Probers: Researchers concentrating on the development of new uses for surplus inedible fats will be interested in a just-issued Dept. of Agriculture publication. Descriptively entitled "The Physical Properties of Fatty Acids, Glycerides, and Derivatives," it's an abstract bibliography of 84 technical papers spanning 13 years' research. Southern Regional Research Laboratory (New Orleans) will send a copy at no charge.

•

Lab Liveners: Activated recently in St. Louis, the first section of Mallinckrodt Chemical Works' planned $1-million laboratory building gives the company 20,000 sq. ft. of new research space. Earmarked for organic chemical investigations, the new structure was designed for the most part by a committee of senior researchers.

Interest-sparking features:

- Alternate single (20 ft. x 40 ft.) and double size (40 ft. x 40 ft.) laboratory units.
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Among the first projects to utilize the new facilities are studies involving alkaloids, synthetic medicinals, and X-ray contrast media.

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Mated: Galacturonic acid is the latest substance to be mated with isonicotinyl hydrazine in the drive for better anti-TB agents. Resulting D-galacturonic isonicotinyl hydrazine has been found (by University of California pharmacy probers) to possess high activity, low toxicity.

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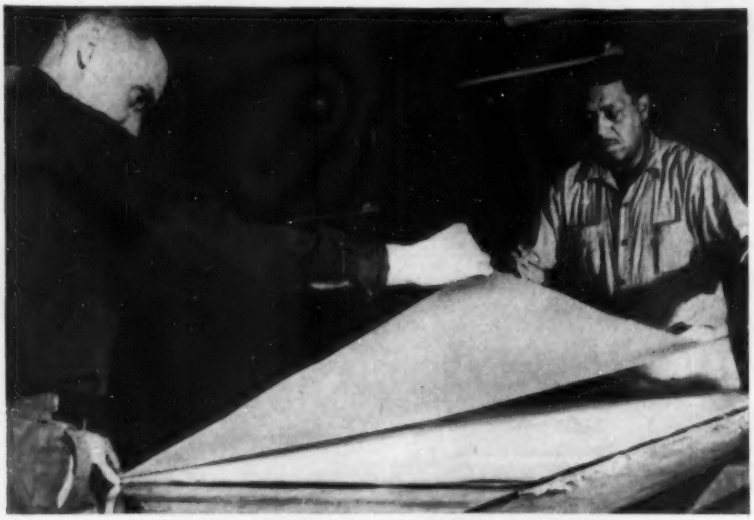

LAMINATE MAKING: First step toward printed circuits.

Substitutes for Wires

With extra-small radios on the market, color television rounding the corner, and Project Tinkertoy an electronic manufacturing wonder, the newest developments in electronics are getting plenty of attention. Likewise, the manufacturing techniques that permit these marvels are being spotlighted—printed circuits have received a major share of public acclaim. And vital to these printed circuits are the inks, coatings, and dielectric materials that permit their fabrication.

The increasing use of printed circuits* has opened new outlets for chemicals—but they're still outlets characterized by variety rather than by volume. Conservative estimates place the value of printed components at $5-6 million a year—but only a portion of that figure represents actual chemical value.

Electron Trail: To make these printed units, a number of "printing" methods have evolved. A recent Bureau of Standards booklet mentions some 26 different techniques—although the distinctions aren't always too plain. They all are, essentially, ways of putting a trail of conducting material onto an insulating plate, whether by chemical deposition, dusting, dyestamping, spraying, or vacuum deposition.

Of these printing methods, silk screening with metal-pigmented paints is probably the most common method of applying the current carrying track. Perhaps behind it are dyestamping methods of making the circuits.

But also classified as printed circuits are "etched" circuit patterns. These are made by dissolving away all but the desired pattern of metal from a nonconductor sheet coated with a conducting metal. They are, in all likelihood, more common in current usage than printed circuits made by any other method.

Backing It Up: For the basic, nonconducting backing used in nearly all these systems, nearly every sort of material has been tried—most of the plastics, phenolic impregnated glass cloth, resin impregnated paper (No. 1 product now) and ceramics. Generally speaking, the plastic and paper types are used for simple circuits that operate at relatively low temperatures, and the ceramics for resistors, capacitors, and the units likely to function at higher temperatures. To some degree, plastic bases can be made to closer size tolerances than can the ceramics.

For volume production, like that of etched circuits, sheet metal—silver, copper, sometimes aluminum coated with copper to improve solder ability—is laminated to the base material. For adhering the metal to the backing, glues of all sorts—phenolics, epoxies, silicones, vinyls—have been used. The glue comes in various forms, sometimes in sheets to be sandwiched between metal and base, sometimes already applied to the metal (*see cut*). The base-glue-metal combinations are bonded under heat in presses.

Take It Off: The actual design is made by printing the wanted pattern on the metal, then dissolving away the unneeded conductor—though it's not quite that simple. Of two common practices, the cheaper involves printing (e.g., by offset) the pattern on the metal with ordinary ink. Asphaltum powder is then dusted on the wet ink, and the plate is oven-baked at about 250 F—that leaves a design protected by a combination coating.

A more complicated but accurate method involves photoengraving (photoetching). The conductor sheet

CAPACITOR PAINTING: For an electronic chore, a silver coat.

* Printed circuits are not restricted to two-dimensional methods of relacing wires; the techniques can be adapted to manufacture of such items as small resistors, and capacitors (*see cut*) as well a wiring patterns and antennas.

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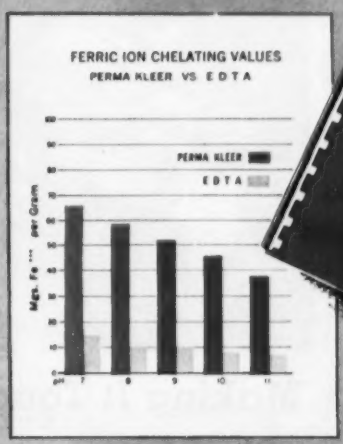

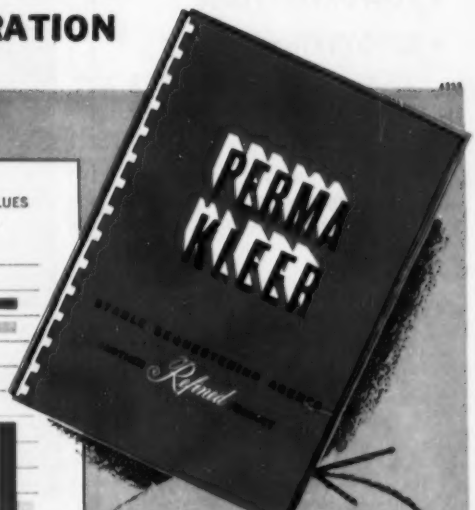

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is thinly coated with a light-sensitive enamel.* It's then masked by a photographically made "negative" of the pattern. Strong arc light alters the enamel, when it passes through the pattern areas of the negative. The plate is then developed in an alcohol bath—unexposed enamel is washed away, leaving a design coated with enamel.

From here, the systems are similar: the plate is dipped in the etching tank (containing ferric chloride for brass and copper, hydrochloric acid for aluminum, and nitric acid for silver).

Powders and Salts: Processes that fit a more popular definition of printing, however, make use of paints or inks that contain conducting powders. Because its salts, as well as the metal itself, are excellent conductors, silver is most commonly used for conductive coatings. Commercial paints of this sort cost $35-45/kg.

* Generally shellacs with ammonium bichromate; light reduces chromate to chromite, and oxidizes shellac.

A typical paint is 65-70% pigment by weight. On commonly used ceramic backing, a binder to hold the paint on is generally a cellulose resin, thinned with, for example, a Cellosolve. For application to thermoplastic material, however, methacrylate and polystyrene is commonly employed (ketones, toluene, benzene, etc., as solvents). On thermosetting material, cellulose-methacrylate resin combinations take acetates, ketones, or Cellosolves as solvents.

In addition to conductive coatings, resistance coatings are made. Graphite and carbon black are pigments. Binders are most often silicone resins, although phenolics and ethyl cellulose can be used. Benzene can be used as a solvent for the silicones; phenolic resin thinners are required with phenolics.

Paint Care: In all cases, considerable care must be taken with the paint manufacture and its application, since characteristics of the unit depend on the thin film put down in the printing. In some cases, the printed

Making It Tough for the Ticks

NEW to South Africa is mass treatment of cattle to prevent disease. But with construction of cattle "crushes" like the one shown, natives are now employing modern pesticides.

Advances in pesticide chemistry have opened vast areas of Uganda for dairying and cattle raising. Rinderpest, one damaging disease, has been virtually eliminated, and currently, attention is being focused on trypanosomiasis, spread by the tsetse fly, and on East Coast fever. As shown in the photograph, Uganda farmers are applying lindane sprays to kill the ticks that transmit East Coast fever.

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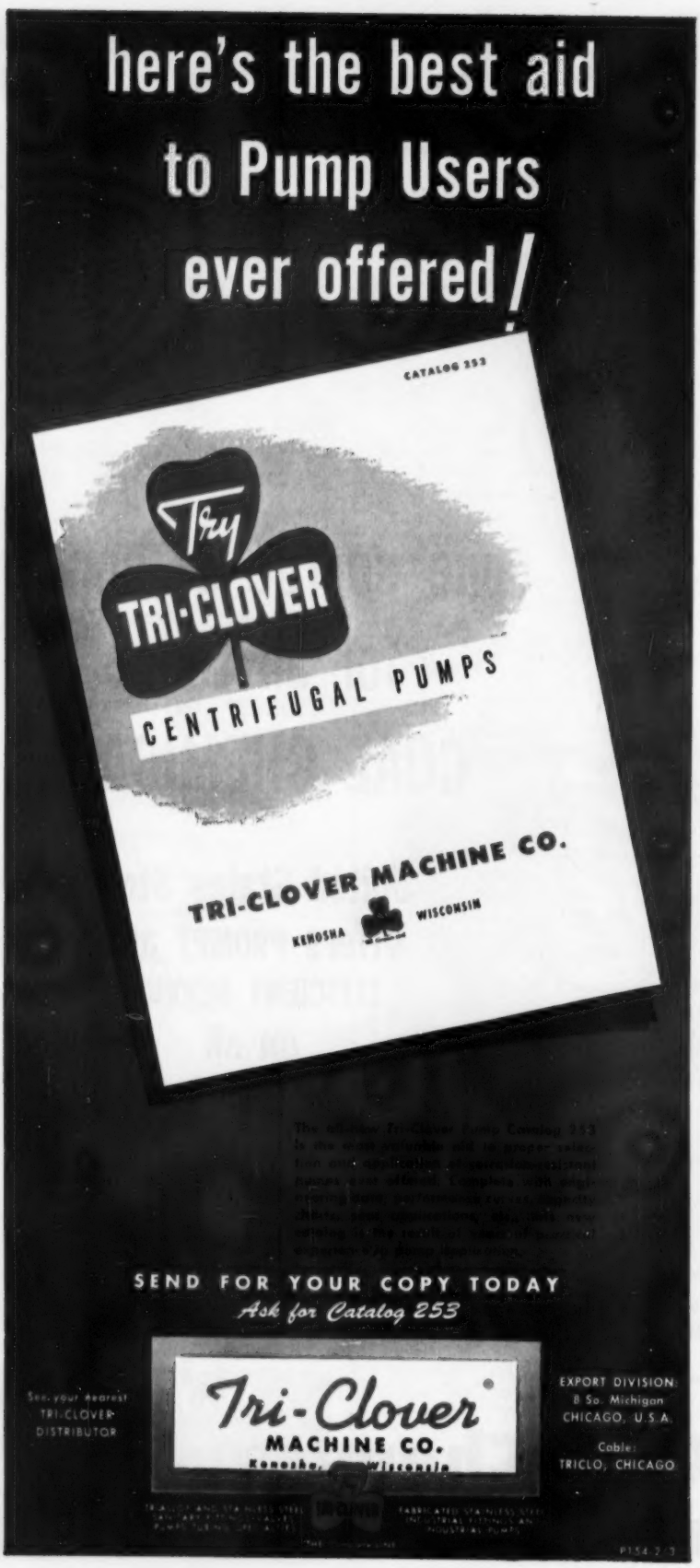

film is built up by ordinary electroplating techniques.

Of other methods used for printed circuit manufacture, most employ silver. It can be deposited from solutions onto a backing that is stencil-covered. For example, silver nitrate and ammonia is treated with a reducing agent like formaldehyde, or sodium tartrate. In other cases, the silver salt solution and a reducing agent are simultaneously sprayed on through separate orifices in the spray nozzle.

Some work has been done with making the circuits by printing the desired circuit pattern with a binder, and then sprinkling in silver dust and fusing it to the backing.

Vacuum processes of two types have found some application: sputtering, in which the base to be printed is made the anode and the conductor the cathode; and evaporation, where the conducting material is "boiled" off and deposited on the insulating plate. Both need stencils.

However the printed circuit is made, it isn't ready for use until it is protected in some way. In exposed circuits, a sprayed-on plastic, such as acrylate, will give desired protection. In cases where the circuit is part of a more complex unit, sometimes the whole assembly is embedded (potted) in plastic. Polyester and epoxy resins are widely used.

Prints Charming: The variety of processes, only touched on here, indicate the consuming interest the electronics industry has in printed circuits. Still, many authorities warn against overrating the business—it has its drawbacks, in spite of how attractive printed circuits sometimes seem.

Cost saving can be startling sometimes—other times the cost to design and engineer for production outweigh direct savings. And durability isn't always improved.

Another objection to their use in home electronics gadgets is that the ordinary radio repairman is uncertain about handling them. They're difficult to solder, and a slip of a screwdriver can cause plenty of damage.

Until a lot of these shortcomings are worked out, printed circuits will remain a valuable, but limited, tool of electronics. And until the time of their widespread use, their value as a market for chemicals will be limited, too.

•

Million-Dollar Push: Kicked off in Chicago last week was Glamorene, Inc.'s $1-million advertising campaign for its rug cleaner, upholstery cleaner and brush bath. Rest of the program will get under way in February.

about Benzoflex Plasticizers

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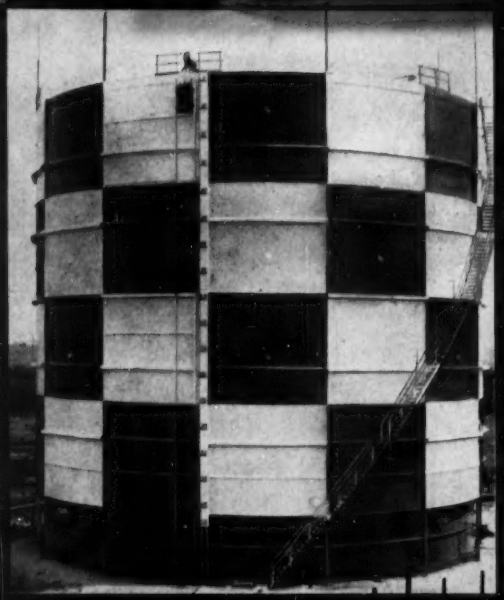

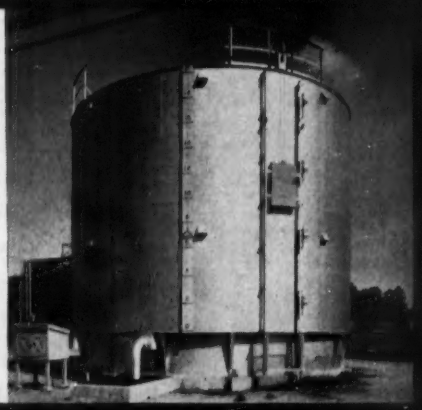

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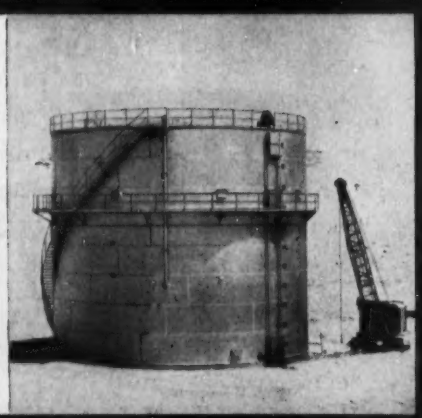

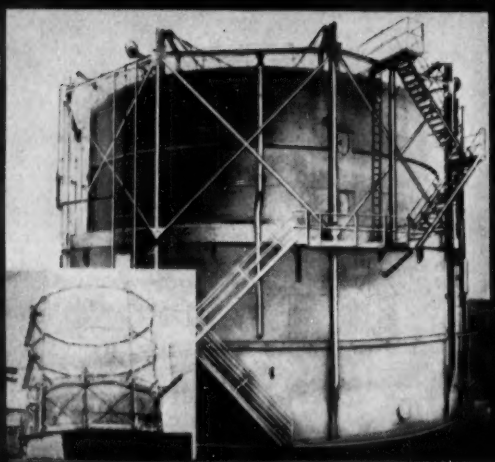

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NO-SMOKING PITCH: Nicotine "slain" in the '90s; "science" the savior now.

Crutch for Will Power

"There's nothing to stopping smoking—I've done it hundreds of times." Today, a smoker reacts to that witticism first with a smile then with a frown. The air is so filled with allegations that smoking is linked with lung cancer, he wonders whether the subject is really one to joke about.

The decision to stop smoking is easy, but going through with it is something else again. Unfortunately, "reformed" smokers aren't much help. Almost invariably they, with righteous zeal, attribute victory to one thing—will power.

Since the tobacco addict generally needs something more tangible to help him break the smoking habit, he often turns to proprietary compounds that "guarantee."

For years there have been any number of these products available. A sizable percentage—perhaps most—have been made by fly-by-nights that were not listed in phone books, that were constantly changing product and company names, operating from different mail order addresses.

Often they would get in scrapes with the Food & Drug Administration because of the chemicals used in their products. There are still such companies today. Saleswise, the business is worth around $1 million a year.

Alkaloid Substitute: The compound most widely employed in the "will power aids" has been lobeline sulfate.* Essentially what lobeline sul-

* Lobeline, which like nicotine is an alkaloid, is extracted from the leaf or herb of lobelia inflata that is grown principally in India, though some is grown here. In medicine, lobeline is given as a respiratory stimulant to help women recover from the shock of childbirth.

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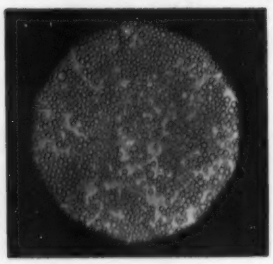

Photomicrograph of Laykold Emulsion

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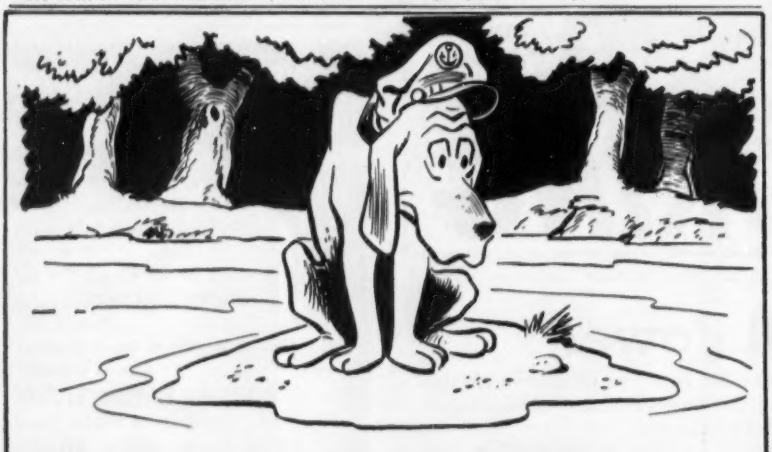

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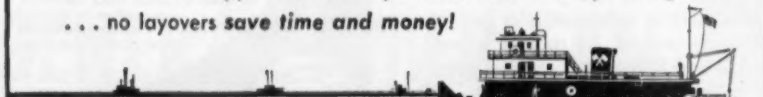

PCT

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fate does for the smoker is to make his stomach "uneasy" with the result that he doesn't feel like smoking.

The total effect is to assist the reformer over the hump during the withdrawal period. Taken in excess, the compound causes nausea, dizziness, acts as an emetic.

Among the best-known tobacco deterrents containing lobeline sulfate on the market today is Bantron, a product of Campana Sales Co. (Batavia, Ill.)—makers of Italian Balm Hand Lotion. Other active ingredients in Bantron are tricalcium phosphate and magnesium carbonate. These are said to possess synergistic properties and to nullify any nausea caused by lobeline sulfate.

The formula first hit the market in 1947 when it was named Quits and manufactured by Laboratory Products Co. (Chicago). Several years later it was bought by Campana, which claims "4 out of 5 people can stop smoking this easy, pleasant way!" Company literature states, "It has no unpleasant after-effects and is not habit forming . . . Smoking establishes a craving in your body—Bantron helps relieve that craving." A box of 30 pills sells for $2.

Directions urge the purchaser to take three pills a day, to ask for his money back if they have not "helped you stop or cut down smoking within 10 days." Each pill contains 1-2 mg. of lobeline sulfate. (Producers of lobeline sulfate are Abbott Labs, Inland Alkaloid and New York Quinine. Their total annual sales of the alkaloid are estimated at $18,000.)

A selling point of Bantron touts that it has been "clinically tested," though Campana doesn't spell this out in advertisements. This hasn't been true of many other lobeline-based products.

Newcomer: Newest of the proprietary smoking "cures" is Flavette, a lozenge containing benzocaine and a mixture of flavoring agents. Manufactured by Norwich Pharmacal Co., it's now being test-marketed in four different areas in the U. S.

Norwich purchased the compound last September on a royalty basis from its discoverer, Dr. William L. Gould, of Albany, N. Y. Originally it had been formulated by Dr. Gould as a control for obesity. Then he learned from a number of patients that the pill had curbed not only their appetites but also their desire to smoke.

This prompted him to do further investigations. In a test involving 349 patients, he found that the compound effectively reduced the desire to smoke in 77% of the cases.

Each 5-grain lozenge has 1/20 grain of benzocaine and is flavored with saccharin, extract of licorice, powdered ginger, and oils of anise, wintergreen, peppermint, coriander, and cloves.

"The amount of benzocaine is that small," says Dr. Gould, "because it is used only for its delaying action on absorption of the flavoring extracts, rather than for any physiologic anesthetic action." He adds, "The safety of this medicament further makes it possible for a patient to take it frequently and as often as necessary."

He contends that there is no drug-antidote for tobacco that is not as bad as the tobacco itself. One he singles out is silver nitrate, which in a weak solution is used as a mouth rinse to affect the taste of tobacco.

As Dr. Gould sees it, smoking is merely one means of satisfying, in part at least, the craving humans have for food—the whole process of sucking, chewing, biting and eating being a fundamentally pleasurable one. It's this "desire to have something in the mouth" that explains why "eating is undertaken more vigorously when smoking is withdrawn."

That's why obesity frequently becomes a real problem when one gives up smoking.

The King: Old-timer in the field is No-To-Bac. No one will say what's in it—just "herbs." Apparently it, too, is a taste proposition. Its maker declares it is "far and away the leader in the antitobacco field."

The product was introduced in the early 1890s by the Sterling Remedy Co., of Indiana Mineral Springs, Ind. —now the Sterling Drug Co. In those days tobacco ads promoted the prowess of King No-To-Bac (*see cut*).

Direct mail pieces stated, "Impotency, in nine cases out of ten, is caused by the use of tobacco, and you will find that No-To-Bac will bring back the vigor of early youth . . ."

Today No-To-Bac is owned by Irving Hirsch of Stamford, Conn., who got into the wholesale drug business in 1915. When he bought it a few years back, it had not been manufactured or sold for nearly 10 years.

Now it's advertised in 150 magazines and newspapers. The current ad reads, "Rush $1 for No-To-Bac for 7 days supply. If you can quit for 7 days, you've won half the battle. Satisfaction guaranteed or your money back."

Hirsch feels No-To-Bac's comeback disproves the adage that once a product fades away it can't be revived. He claims that it "is not made under the

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modern formulas of other antitobacco products but still has the self-same formula that helped millions to stop smoking in the '90s and is doing an even better and more fabulous job today."

Why They Exist: There's a basic reason for the existence of proprietary smoking "cures"—even the ones that get in trouble with the FDA. They sell mainly because there appears to be nothing in the ethical field that a physician can prescribe for a patient who needs medical assistance in giving up smoking. Sometimes a physician will give phenobarbitol for the first few days but after that the patient is on his own.

Whether Bantron or No-To-Bac do the job their makers claim they can do, and whether Flavettes will succeed where other products have failed, it's clear that people who need to give up smoking don't have much of a choice. Just as science has yet to investigate the effect of tobacco on the human body in a thorough manner, so must smoking-deterrent manufacturers do more spade-work if they're to satisfy calls from would be "quitters."

•

Franchise: Guardian Chemical Corp. (Long Island City, N.Y.) recently sold Turner-Smith Drug Co. the exclusive franchise for distribution and sale of two grades of Clorpactin for treatment of acne. The product, tradenamed Clearoxin, will be marketed in 80 cities starting late this month. Clorpactin is a buffered hypochlorous acid composition with almost neutral pH.

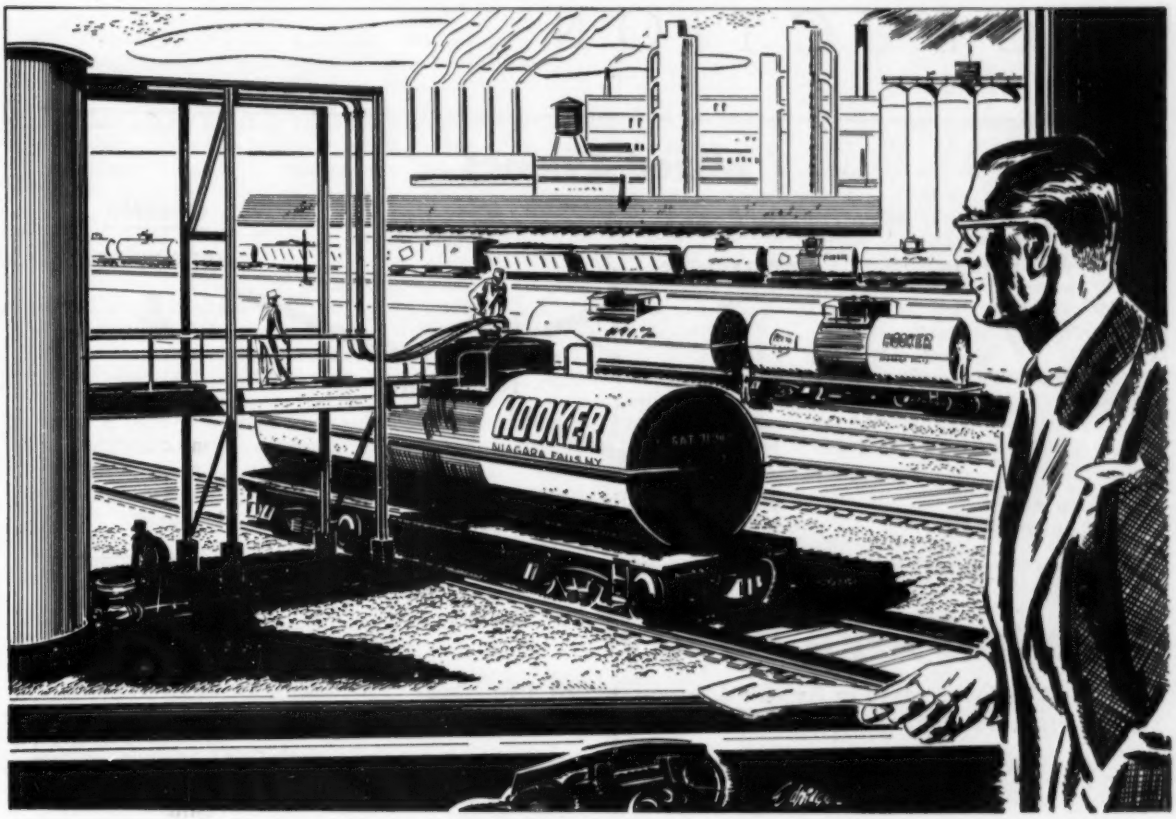
•

Pressure-Sensitive Tape: Connecticut Hard Rubber Co. (New Haven) is making a pressure-sensitive tape, Temp-R-Tape-T, which it recommends for sealing high-temperature and chemical ducts. The manufacturer says it has as a base Teflon tetrafluoroethylene resin, is effective over the temperature range of —80 F to 400 F.

Additional uses for the tape: as a facing material to provide a nonsticking surface for packaging machinery, and as an electrical insulating tape. It is manufactured in widths varying from ½ to 12 in.

•

Paper Strengthener: The Borden Co.'s Chemical Div. is making a new resin designed to improve wet strength, folding endurance and scuff resistance of paper stock. The resin, PR-165, is recommended for toweling stock since it strengthens the paper without affecting its absorbency.



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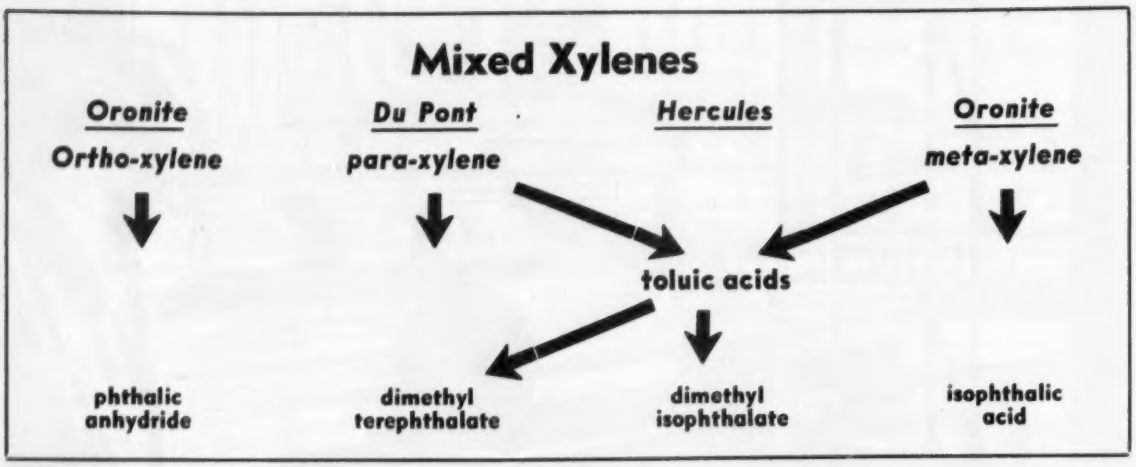


One to Make Ready . . .

The latest move in Hercules' three-pronged diversification program is a plant to make DMT for CIL's Terylene.

It will forsake nitric oxidation, use a new air oxidation. The key: esterification of the toluic acid intermediate.

The plant will slow up—not halt—Hercules' development of DMI and other potential products of the same process.

Opening two new plants using new processes should be venture enough for any company in one year. Not so for Hercules Powder. Just about ready to bring in its widely discussed plant for making chlorine from by-product hydrochloric acid at Brunswick, Ga. (*CW, Jan. 19, '52, et priori*), it's planning to start up its phenol-from-cumene plant at Paulsboro, N.J., (*CW, Nov. 7, '53, et priori*) later this year. Now it has decided to build a $4-million* plant at Burlington, N.J., that will pioneer a process to make dimethyl phthalate (DMT) for Canadian Industries Ltd.'s Terylene synthetic fiber.

For the plant, Hercules will buy para-xylene from Sinclair's Marcus Hook refinery (through the latter's subsidiary, Sinclair Chemical). It will turn out 12 million lbs./year for CIL's Terylene plant under construction at Millhaven (Ont.), has a five-year (1955-60) contract to supply DMT to CIL at the termination of which the Canadian firm has an option either to continue buying or to license from Hercules and make its own.

The Paradox: At first glance, this latest plan of Hercules doesn't shape up as a winner: it's entering a field where it has no preferred position in raw materials and where its output is tied to the fortunes of another firm's fiber. And in spite of a great deal of its own process development work, it will operate under a nonexclusive license from California Research, a Standard Oil (California) subsidiary.

On closer inspection, however, the parts of the puzzle start falling into place and the move begins to make sense. In the first place, says Hercules, while it doesn't have a captive source of xylenes, they are basic and plentiful. And if the company is dependent on a refining operation for them, many companies are dependent on the same operation for benzene, and a large segment of the industry still gets its raw materials from coke ovens. It adds that there's nothing wrong with building a plant for a product that's an intermediate for someone else's fiber. To clinch this argument, it points to its successful history of making acetate for rayon manufacturers.

And by the same token, Hercules isn't putting all its eggs in one basket—not even a Terylene one. For while the immediate future of DMT is in making fibers or film (Mylar), the firm feels that it's a versatile chemical that could easily find other heavy-volume outlets. What's more, the same process that converts para-xylene to DMT can produce dimethyl isophthalate (DMI) as well as DMT from a feed of mixed xylenes (70-85% meta, the remainder para). And while some in the trade take a dim view of the market potential for DMI, Hercules is convinced that it will find a niche as an industrial chemical. It takes the same optimistic outlook on the toluic acids that are formed as intermediates in the process.

The Process: But probably the most significant factor in Hercules' decision to build is its hard-earned process know-how. It spent six months researching the process at the laboratory level, operated a semicommercial plant at Burlington for a year (working on both mixed xylenes and straight para feedstocks) and spent another six months on small-scale piloting before going ahead with the big plant.

All this development work has left the Hercules' till some $1.5 million poorer. But the firm feels it has obtained more than a fair return on its investment through a basic understanding of the process and through the data and other engineering knowledge required to make a commercial plant work.

The fundamental chemistry of the process is covered by the Imhausen Werke patents issued in Germany and the one issued to California Research

* Actually $4.75 million including working capital. Since service facilities and general utilities are available at the site, the figure is considerably lower than it would be for a comparable plant being built on a new site.

here last fall (U.S. Patent 2,653,165). And though the Cal Research patent dominates the field in this country and Hercules has had to obtain a nonexclusive license, it has obtained exclusive rights to the German patent applications in Canada.

The conventional way of making DMT (and the one both Imperial Chemical Industries and Du Pont employ) is a nitric acid oxidation of para-xylene to terephthalic acid and an esterification to DMT. Air oxidation, as used to convert ortho-xylene to phthalic anhydride, would have certain obvious advantages. Only difficulty is that yields have been poor. Here's why:

One methyl group of para-xylene oxidizes readily to give para-toluic acid in good yields. But the second methyl group goes very slowly, and the air starts to chew up the ring structure.

Cal Research workers found that yields improved considerably when the toluic acid was first esterified. This ultimately yields the monoester of terephthalic acid, which can be esterified to DMT*. Oxidation of the toluic acid ester goes forward under moderate temperatures either at atmospheric or higher pressures and with or without catalysis. Catalysts that re suitable include oil-soluble salts of manganese or cobalt. Cobalt naphthenate, for instance, can be used.

The Hercules plant will employ a four-stage process: air oxidation of para-xylene to toluic acid, esterification with methanol to methyl paratoluate, a second air oxidation to monomethyl terephthalate and a final esterification with methanol to DMT

As Hercules sees it, the process has several advantages over the nitric acid method. The most obvious one, of course, is a saving on cost of the acid. But Hercules thinks its process also has an edge on yields, points out that it sidesteps a potential stream pollution problem. On the other hand, air oxidation is a trickier process, calls for more careful control of the process variables.

The Pay-Off: Any time a company decides to build a plant using a new process, it's bound to attract a lot of attention. In this case, the move carries added significance since it gives promise of opening up new fields for the xylenes.

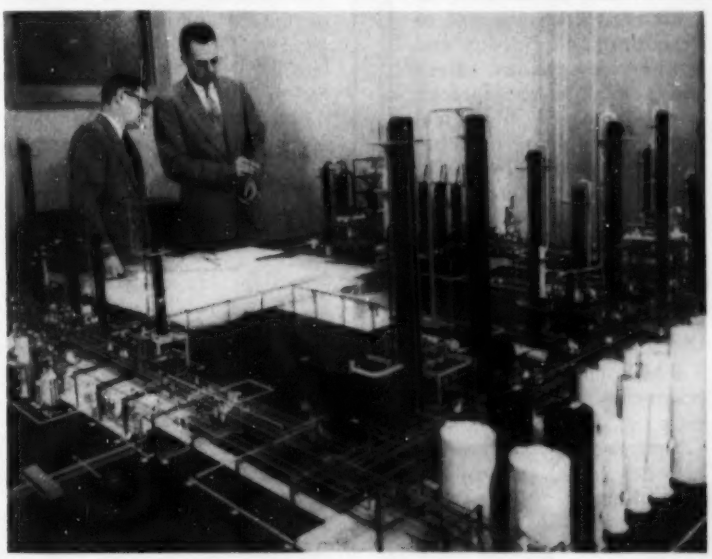
The ideal situation for the xylenes, which are spewing forth in large quantities from platformers, would be one where they could be separated into the three isomers, each of which could then be put to work as a raw material. At present, the ortho isomer poses no problem, for it's easily separated from the other two, can be converted into phthalic anhydride.

The para and meta, however, are difficult to separate. And even after separation, there's been no substantial outlet for the meta isomer. Hercules isn't the only company to realize this. Nevertheless, Oronite has spent many man hours of investigation on possible uses for the meta, thinks it has a winner and has therefore decided to go ahead with a plant to make 50 million lbs./year of isophthalic acid from meta-xylene. It will use a new, still secret process for the venture.

And American Cyanamid has been flexing its muscles, is a safe bet to go ahead with a methylstyrene plant. The firm has worked up two processes (*CW, Oct. 24, '53*), one of which would utilize meta- and ortho-xylene to leave a para-rich residue.

The Hercules plant is another step in the same direction. Right now, it is interested in getting the DMT plant going. It will use the semicommercial plant at Burlington to make DMT for CIL's experimental runs until the big plant is completed next May. This will cut down on the availability of DMI, toluic acid and other acids that the firm has under development, and "may," says Hercules, "even hamper the general growth of these new products temporarily."

But it isn't ready by a long shot to shelve the idea. The consensus now is that establishing a market for DMI will take a lot of doing. But Hercules apparently feels that the prize is more than worth the effort; if the firm succeeds it will have a process that will take the much cheaper mixed xylene feed stock, convert it into two easily separated, readily salable products.



. . . One to Go

WHILE HERCULES is making plans for DMT production, it continues to push ahead on another phase of its diversification program. Last week, the firm disclosed a completion date – next September – for its phenol-from-cumene plant in Gibbstown (N.J.). Looking over the $15,000 model (*above*) of a portion of the plant are Paul Mayfield, general manager of the Naval Store's Dept., and Lyle W. Rothenberger, general superintendent of the plant. The B.A.-Shawinigan plant in Canada using the same process experienced some difficulties during the shakedown period, but Hercules feels that the kinks have been ironed out.

* DMT rather than terephthalic acid is the preferred raw material for Du Pont's Dacron and ICI's and CIL's Tyrelene. The acid is a high-melting solid, whereas the diester is a crystalline solid that melts at 140 C, is easier to handle and purify.

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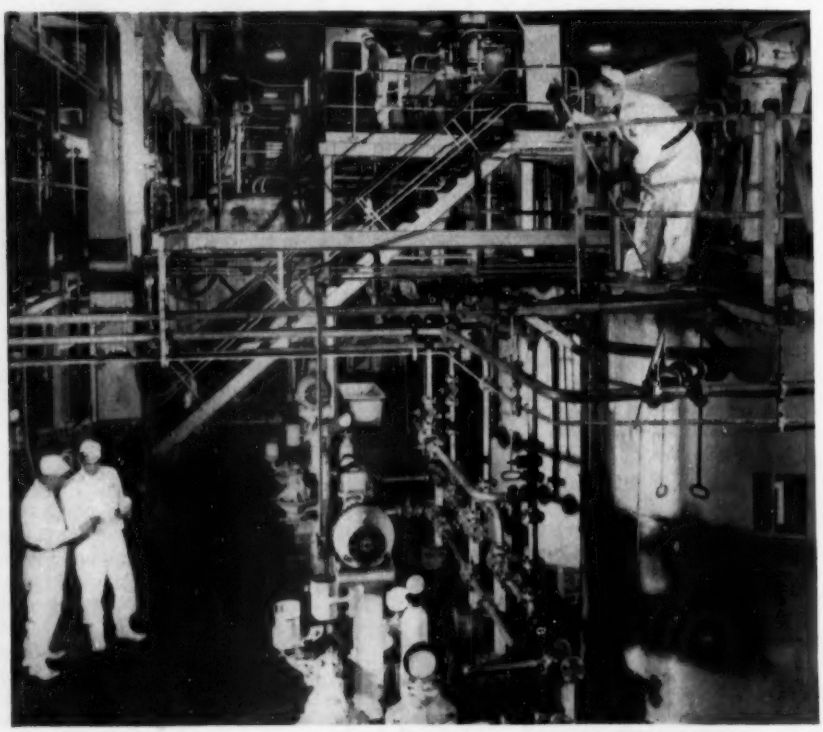
SERENE SURROUNDINGS at headquarters of British atomic factory point up the . . .

Preparing for Peace

Assuming the possibility of an international atomic information pool, last fortnight the British made a bid for a share of the pot, laid down some of their high cards to give the rest of the world an indication of what they've accomplished in the way of harnessing the atom for peaceful applications. Here are three of the first pictures of Great Britain's atomic production.

It's fairly evident that while the nation may have been outdistanced in the production of atomic weapons, British chemical engineers have been exploiting their knowledge of unit processes toward converting nuclear power to electricity. Says Duncan Sandys, British Supply Minister:* "It

* In "Britain's Atomic Factories", a government publication.

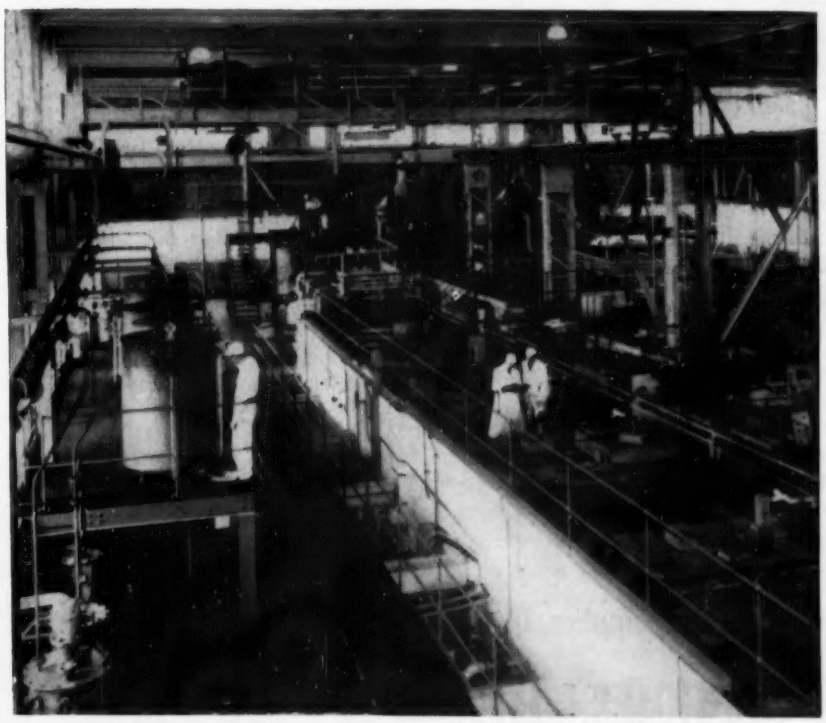


AT SPRINGFIELDS FACTORY, uranium ore is crushed and dissolved.

. . . contrast between war and peaceful uses for the atom.

is right that the world should be told how fissile material is today being produced in Britain and of the remarkable factories and plants which have been designed and erected to carry out these strange processes."

Center of the network of "remarkable factories" is Risley, in Lancashire, where blueprints for the three large factories at Springfields, Windscale and Capenhurst were evolved. Windscale, the plutonium plant, is now producing in quantity from its two piles. At Springfields, the uranium ore is ground to powder and dissolved in acid. The crude product from there is shipped to Capenhurst where the impure uranium solution is enriched and purified to convert it to a suitable fuel.



AT CAPENHURST FACTORY, impure uranium solution is purified.

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KAY-FRIES SPECIFICATIONS . . .

purity	•	99.0% min.
melting point	•	119.0°-122.0°C (meniscus to complete melt)
ash	•	.05% max.
solubility	•	1 gm. completely soluble 9 gm. dist. H_2O

Typical reactions of CYANOACETAMIDE

REDUCTION

$CNCH_2CONH_2 + 2H_2 \xrightarrow{\text{catalyst}} NH_2CH_2CH_2CONH_2$ (amide of β-alanine)

DEHYDRATION

$CNCH_2CONH_2 \xrightarrow{\text{catalyst}} CNCH_2CN + H_2O$ (malononitrile)

CONDENSATIONS

$2CNCH_2CONH_2 + RR'C{=}O \xrightarrow{\text{catalyst}} RR'CCH(CN)CONHC(=NH)CHCONH_2 + H_2O$

(ketone or aldehyde; substituted piperidine)

$CNCH_2CONH_2 + RCOCR'HCOR'' \xrightarrow{\text{catalyst}} RC=C(CN)CONHCR''=CR' + 2H_2O$

(diketone; substituted pyridone)

TECHNICAL DATA BULLETIN AVAILABLE

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PRODUCTION . . . . EQUIPMENT

Dustproof Motor: A new taconite-dustproof motor is the latest offering from the Crocker-Wheeler Div., Elliott Co. (Jeannette, Pa.). Of value wherever dust is a hazard, says the firm, it is of particular use in ore refining plants using the taconite benefication process where crushing, mixing and drying operations produce an atmosphere burdened with fine magnetic dust.

•

Any Size: Labline, Inc. (Chicago) just recently introduced its new line of constant temperature rooms. Ranging from 2 ft. deep reach-in type to 8 ft. deep walk-in type, the rooms are 4 ft. wide by 7 ft. high, permit temperature control anywhere between 40-140 F.

•

Moisture Meter: Accurate, precise and portable is the way Heyl & Patterson, Inc. (Pittsburgh) describes the new Olivo moisture meter it is introducing to the U.S. The meter, says H&P, is accurate to within 2% when measuring surface moisture in powdered, granulated or fibrous material.

•

Fast Pickup: Consolidated Engineering Corp. (Pasadena) claims its new electrical resistance (Type 4-312) pressure pickup will give immediate response to changes where pressure transients occur too rapidly for observation with conventional devices. The miniature pickup is being offered in gauge, absolute, differential models.

•

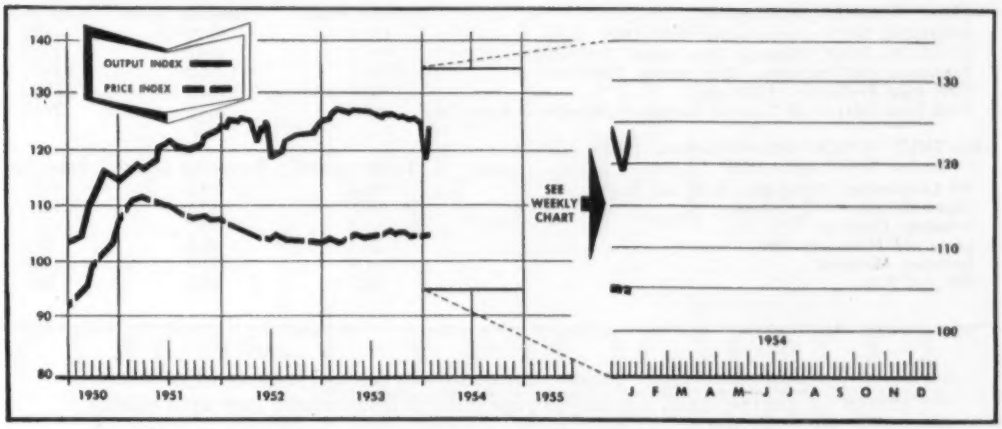
Temperature Control: Newly available from Partlow Corp. (New Hartford, N.Y.) is its nonindicating, explosion-proof temperature control. Mercury actuated, model VS maintains temperature by regulating the flow of steam, oil, gas or electricity used to heat the appliance.

•

Long Line: Over 800 basic models are included in Hydraulic Press Mfg. Co.'s (Mount Gilead, O.) new line of hydraulic cylinders. Featured: a wide range of standard mountings, heavy duty construction, spring-loaded piston rod packings for positive sealing and solid steel end covers. Bore sizes range from 1½ to 12 in.

•

Wide Vision: Highlighting General Scientific Equipment Co.'s (Philadelphia) new dust hood is a large "picture window" offering unrestricted vision to wearers. Light weight (5 oz.), easy to wear, claims General, the hood is designed for use where nuisance dusts are present.



CW Index of Chemical Output—Basis: Total Man Hours Worked in Selected Chemical Industries
CW Price Index—Basis: Weekly Prices of Sixteen Selected Chemicals

MARKET LETTER

Whether or not the Soviet bloc of nations will get some U.S. surplus agricultural commodities is still a moot question. Only decision made so far is that there will be no "cut-rate" sales to Russia and her satellites.

Foreign Operations Administrator Harold Stassen late last week confirmed an indication (CW, Jan. 23) that the hot-potato decision may be up to President Eisenhower. It may come in the next couple of weeks if the various government agencies involved can't get together on what course to follow.

Although the U.S. has taken a loss on overseas sales of other price-supported surpluses—for example, the 77 million lbs. of linseed oil tagged at half the domestic 17¢/lb. price (CW Market Letter, Dec. 26, '53)—the distinction between those cases and the current East-West trade imbroglio is wrapped up in the U.S.'s avowed policy of strengthening free countries.

•

Naval stores, on the other hand, are still among the few profit-making items handled by the Commodity Credit Corp. At the moment, though, there's a great big question mark floating over the gum rosin market: When will the government come through with its 1954-55 price-support announcement? The crop-prop plan is usually posted in December, but even at this late date Washington is stumped on the when-how much poser.

Some trade speculation, however, has it that the support level will be set next month under the present 90% parity. Actually the news will have little more than a market-tension easing effect, for some observers say the uncertainty is more unnerving than the possibility of a low percentage-of-parity peg. Reason: all but some 82,000 drums have been redeemed from the last loan period; gum rosin production during the next crop year will likely be lower than 1953-54's; both domestic and foreign gum needs are evident, despite the current hand-to-mouth buying induced by the government's hesitancy.

Many overseas traders are keeping out of the market, hoping that a low price-prop will tumble market tags, but chances are that even if the figure drops to the 60% floor, CCC will slap a freeze on its 602,000-drum stocks, nullify the market-depressing possibility.

WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
CHEMICAL WEEK Output Index (1947=100)	124.2	124.2	126.2
CHEMICAL WEEK Wholesale Price Index (1947=100)	105.1	105.0	103.1
Bituminous Coal Production (daily average, 1,000 tons)	1,363.0	1,365.0	1,593.0
Steel Ingot Production (1,000 tons)	1,760.0 (est.)	1,766.0 (act.)	2,240.0
Stock Price Index of 13 Chemical Companies (Standard & Poor's Corp)	268.7	264.3	259.5

MONTHLY INDICATORS—Wholesale Prices (Index 1947-1949=100)	Latest Month	Preceding Month	Year Ago
All Commodities (Other than Farm and Foods)	114.6	114.5	112.9
Chemicals and Allied Products	107.1	107.2	103.3
Industrial Chemicals	118.6	119.2	112.3
Drugs and Pharmaceuticals	93.8	93.5	91.3
Fertilizer Materials	113.9	112.9	113.0
Oils and Fats	58.5	58.0	52.8

Depressed by no means, but definitely easing, is toluol. Producers' stocks, of course, have not as yet reached the level where any appreciable surpluses are available to industrial consumers, but continuing government defense cutbacks have taken off the heavy pressure. For instance, February's arsenal-siphoning of coal tar material will amount to 50% of total production compared with last year's 70%.

There's no telling just how far Uncle Sam's purchases will go during March and April, but further shaving is a definite possibility.

Petro-toluene makers, too, are moving all their output, are slighting no customers. Supplies are better because of reduced use in avgas.

As indicated here (CW Market Letter, Nov. 14, '53), availability of greater amounts of the aromatic for civilian uses may exert some downward pressure on price tags, but producers say chances are slim for any reductions in the immediate future.

•

In the nonferrous metals market, new lower prices are attributed, via a circuitous reasoning, to foreign pressuring. Price breaks in lead and zinc on the London Metal Exchange has U. S. sellers fearing that reduced London tags will tend to divert foreign material away from European markets to the higher-priced U. S. counters.

The half-cent trimming of domestic lead and zinc prices is an attempt to make the market here less attractive, stem the expected flood of overseas metal.

Some observers opine, however, that dragging demand over the past few months, military stretch outs and piling-up stocks also pressed heavily on prices. Current quotes peg lead at 13¢/lb. (N.Y.), prime Western zinc at 9½¢ (East St. Louis)—lowest for the latter in almost five years.

•

The recent 20% reduction in feed grade riboflavin brings most makers schedules to 8¢/gram (not 98¢—a typo error in last week's CW Market Price Changes). Trade followers are convinced the new price will contribute to a market firming, will soon eliminate the 7¢ -figure still being quoted by some newer marketers. There's no change in pharmaceutical grade material; it's pretty stable at 10¢/gram.

SELECTED CHEMICAL MARKET PRICE CHANGES—Week Ending January 25, 1954

DOWN

	Change	New Price
Red lead, Pb_3O_4, bbls. c.l., works, frt. equald. 95pcs	$ .005	$ .155
97pcs	.005	.1575
98pcs	.005	.16
Litharge, com'l., powd., bbls., c. l., works, frt. equald.	.005	.15

All prices per pound unless quantity is stated.

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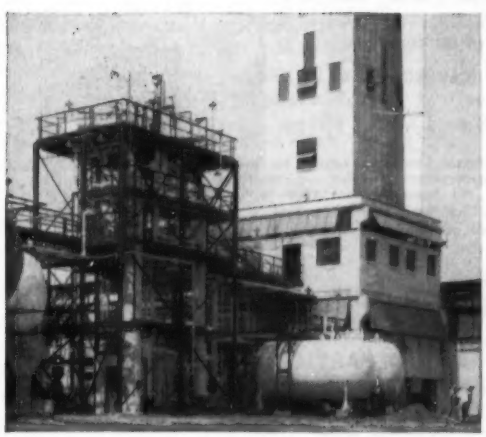

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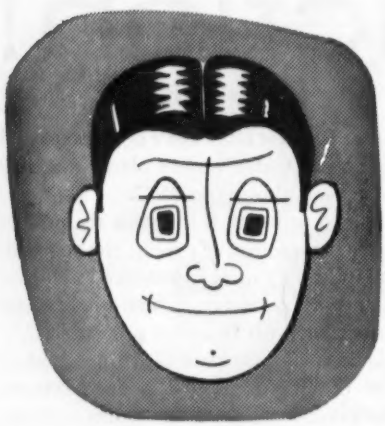

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in the field of POWDER METALLURGY—Metasap Zinc, Aluminum, Magnesium, and Lead Stearates provide lubricants that give high green compact density, reduce friction between punches and die walls, assure easy ejection from dies.

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Polyhydric Alcohol Output

(millions of lbs.)

	Glycerine*	Ethylene Glycol	Propylene Glycol	Pentaerythritol (PE)	Sorbitol
1950	223.0	519.0	79.0	36.0	7.5
1951	211.0	597.0	89.0	45.0	22.5
1952	188.0	761.0	91.0	41.0	50.5
1953	218.0	650.0	57.6	53.0	60.0
1954 (est.)	225.0	725.0	68.0	55.0	70.0

*Includes synthetic.

POLYHYDRIC ALCOHOL OUTPUT: Up straight across the board means a further battering, but 1954 may be the year . . .

Glycerine Downslide Skids To A Halt

This week—Tuesday to be exact—a crowd of glycerine-steeped producers, refiners, consumers and other enthusiastic rooters piled into New York's swank Waldorf-Astoria hotel. Occasion: the Assn. of American Soap and Gycerine Producers 27th annual convention. One perennial plinth of the agenda is a round-robin klatch on the past, present and future of the chief polyhydric, and this year's collective gaze at the glycerine picture was more penetrating than usual. Reason: 1954 could well be a crucial year for glycerine.

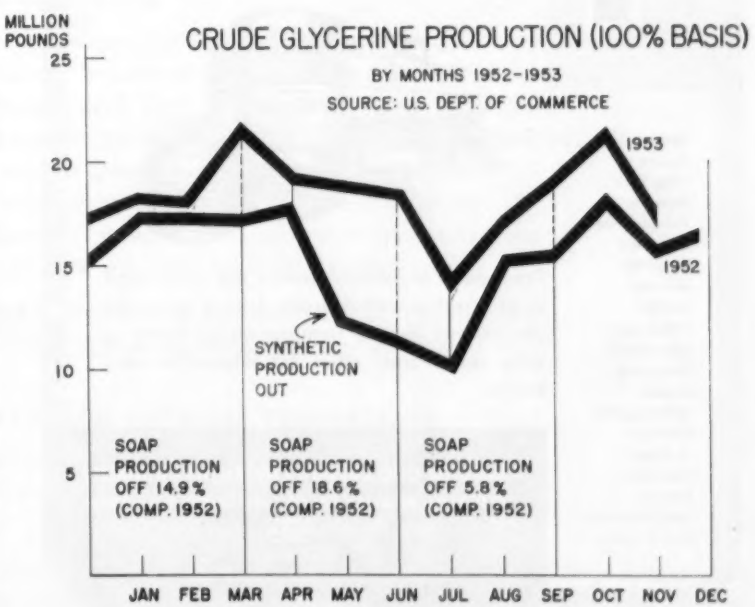
It's no news that glycerine's preeminence on a multiplicity of fronts has been—and is being—challenged by a raft of competitive products,* but there are definite indications that the old polyol will weather the storms, emerge still all-round top-dog.

One bolstering factor, says the association's glycerine manager Scott Pattison, is that this year will find glycerine supply fully adequate and steady enough to offset "feast or famine" effects, which in the past have driven consumers to seek substitutes or to anticipate indigestible glycerine gluts.

The "steadibility" trend is pointed up by glycerine production data for the last two years. During 1953 domestic output of crude and synthetic (on a 100% basis) amounted to about 218 million lbs.—about 30 million above the 1952 level. Last year's figures were consistently higher, month by month, than 1952's, despite a factor one would expect to be a depressant—a repeated quarterly dropoff—compared with corresponding periods in 1952—in soap production. (The percentages off: 1st quarter, 14.9%; 2nd, 18.6%; 3rd, about 5.8%. Figures for the last quarter aren't out yet, but chances are about even that they, too, will be slightly on the minus side.)

Reason behind the surprising rise in the face of falling soapmaking, is threefold:

- Use of better grade fats in the manufacture of soap, wth a proportionate increase in glycerine yields;
- Greater production of glycerine as a co-product of fatty acids and fatty alcohols;



* Pentaerythritol; sorbitol; ethylene, diethylene, triethylene, propylene glycols.

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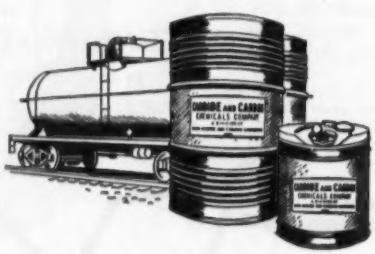

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MARKETS . . . . . .

• Increased production of synthetic glycerine.

Adding to the 1953 domestic total the record-breaking amount of imports (*see chart, p. 79*), about 32 million lbs., and the 37-million-lb. carry-over at the beginning of the year, gives a glycerine availability of near 287 million lbs. With consumption pegged at roughly 225 million, glycerine followers are quick to point out that year-end stocks are again back in a normal stage equal to three months' consumption, or approximately 60 million lbs.

The days of a glycerine shortage bugaboo may well be numbered. For instance, a decline in soap production over the next few years, equal to that of the recent past, would bring domestic glycerine from this source well below 100 million lbs. But that level overlooks glycerine from industrial fat-splitting and fat-derived detergents—fields in which there is evidence of continuing offsetting growth.

Tallow acids are being modified and split down the middle to edge into big-volume outlets (e.g., plasticizers, synthetic fibers, lubricants). New fatty alcohol capacity* is being installed. Assurances that glycerine-from-fats will not likely fall below a 125 million lbs./year rate. Chances are good that these sources will account for about 150-155 million lbs. of glycerine during the present year.

Synthetic output—in effect an intra-industry scrambler for markets—will contribute to the underpinning of future glycerine availability. When Shell Chemical—currently the only U. S. synthetic glycerine producer—came onstream in the fall of '48 with its plant at Houston (Tex.), capacity was tacked at only 36 million lbs./year. By 1951 production hit about 40 million. Because of a prolonged strike at the installation the following year, output dropped back to 36 million lbs.

Then later expansion and streamlining at the plant hiked capability to a rated 55 million lbs./year. Pound production during 1953, however, actually exceeded that figure, could have conceivably come closer to 60 million. Shell, understandably enough, jealously guards its output data, but has revealed additional expansion in the works that will add another potential 25 million lbs. of synthetic glycerine to the pot by late this year.

Shell's reticence to talk is probably sparked by the fact it will soon lose the mantle of "only synthetic glycerine producer". Moving into the field is Dow Chemical's proposed Freeport

* The Archer-Daniels-Midland sodium reduction plant at Ashtabula (O.).

scavenging with HYDRAZINE

As a scavenger of oxygen and chlorine in liquid and gas streams, hydrazine and its derivatives demonstrate many interesting characteristics that suggest further research and development. For example . . .

trace oxygen

As an antioxidant, hydrazine and its derivatives have proved their efficiency and economy. In the case of boiler feed water, hydrazine is used to prevent corrosion; it may also be an effective means of controlling oxygen-caused bacterial growth and side reactions. Complete oxidation of hydrazine produces only nitrogen and water . . . an important consideration in many reduction reactions.

free chlorine

The effectiveness of hydrazine in the removal of free chlorine is demonstrated in the manufacture of CP muriatic acid. Here, hydrazine hydrate is added in stoichiometric proportions to the storage tanks or tank car. The reaction products are HCl and nitrogen. This application suggests new uses of hydrazine for the purification of other halogen acids as well as anhydrous forms of these acids and other liquids and gases.

Further information on hydrazine and its derivatives is available . . . please write on company letterhead.

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(Tex.) plant. Though ground has not as yet been broken at the site, Dow intimates that CW's "guesstimates" *(CW Market Letter, Aug. 1, '53)* are on the beam; the newcomer will be producing at about a 25-35 million lbs./year clip by late 1955.

Thus, taking into consideration the synthetic glycerine production now operating, building or announced and adding it to the expected natural output (from fatters and soapers), it becomes apparent that the domestic supply some three years hence will land in the 250-275 million-lbs. range. That should keep the glycerine price reasonably steady, throw some effective stumbling blocks in the paths of other polyol glycerine-market encroachers.

Glycerine End-Use Pattern 1952 Estimate

	(million lbs.)
Alkyd resins, ester gums	70
Tobacco	30
Explosives	30
Cellophane	26
Cosmetics, dentifrices	12
Other drugs, pharmaceuticals	12
Misc. (food, glassine paper, etc.)	5

There's more than a passing interest in the U. S., too, in an alternate glycerine-producing route long-testing in Great Britain. Imperial Chemicals is pilot-planting quantities of the material via molasses fermentation.

The process piqued interest of a number of American companies (among them, Harshaw, National Distillers), when glycerine was high-priced. But trade talk has it that some amounts have actually been produced on a small scale here, that interest has not been deterred by current relatively low crude tags.

How Much, Whereto? Though it's difficult to accurately finger glycerine's end use trends, a glance at a previous CW estimate does approximately plot current users *(see end use table)*.

The pattern has been distorted somewhat in the ensuing months, but not drastically; this year's consumption is likely to be in the same ratio, compared with the production increase. Outlets like alkyd resins and protective coatings, cellophane, tobacco (discounting the recent "bad

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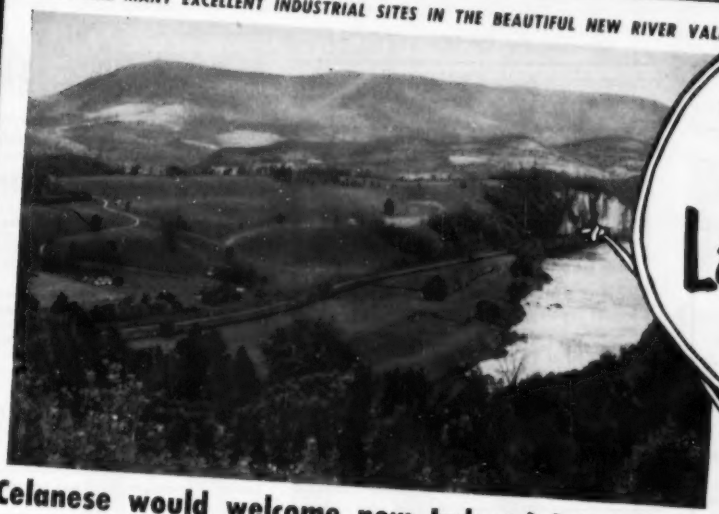

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Many area business and civic leaders have also recognized the industrial advantages of our area, and have been working quietly for some time to attract new industry. The Giles-Mercer Industrial Council has made public its long-range program of promoting these advantages to outside industry by means of a recent booklet.

Celanese likes the idea of having additional industrial neighbors in the New River Valley. Such expansion would contribute much to a healthy and desirable economic growth of our Giles County section.

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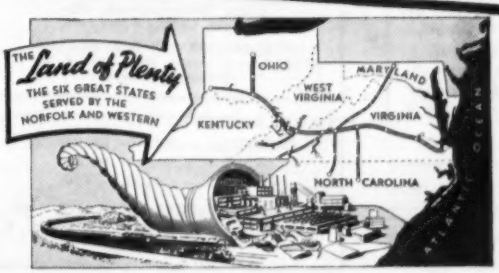

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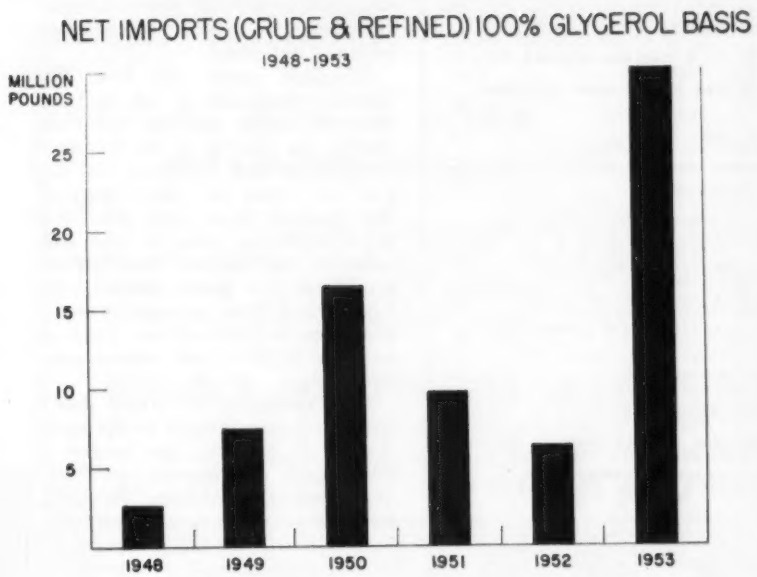

publicity"), are up; glycerine in explosives is perhaps declining.

One field of growing importance, however, is that of monoglyceride emulsifiers for margarine and shortening, and for other food and industrial uses.

Target Trys: Glycerine is—and has been—the largest of the polyols for nonantifreeze uses, has made it mandatory for other polyhydric alcohols to chip at its time-tested outlets in order to grow. For instance, in the alkyd resin arena, pentaerythritol (PE) has edged in heavily. About two years ago, approximately 35 million lbs. of PE went into the resins; the take is now nearer 52 million lbs. Sorbitol, too, is shooting for the same target as well as some of the other outlets.

Estimates peg Atlas' product in for some 6-7 million lbs. of the alkyd pie, 10 million as a humectant, about 5 million lbs. in food, drugs, etc.

Ethylene glycol long ago cornered the antifreeze market, and warm-weather-depressed demand accounts for most of the production drop in 1953. But this year's output will probably bounce back to a near 725.0-million-lb. level from last year's low 650. It's more than possible that some 250-300 million lbs. will move into glycerine-like uses—cellophane, permissible explosives, tobacco. Add too, synthetic fibers (Dacron-type), and of course, detergents, and it figures that the glycols will do all right.

But glycerine market development is not static, new growth possibilities are far from being neglected. Just recently, in England, for example, it has been proved important in a new aluminum coating process. Aceto stearins, made with glycerine, are getting commercial trial as plastic food coatings.

And biochemical work in particular is reconfirming the fact that glycerine is more intimately linked with life processes than are the other materials traveling under the generic "polyol" label.

Glycerine boosters are convinced, too, that the mere long-term expectation of steady supply at a practical price level will bolster research, open up additional outlet possibilities.

Summing it up, one conclusion stands out: outcome of the billion lbs./year polyhydric alcohol scramble may well depend on such variables as price tags, availability, inherent suitability for use—but the polyol crown, though knocked askew by many contenders, will continue to be perched on glycerine's brow—at least for another year.

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CHEMICAL WEEK • ADVERTISING INDEX

January 30, 1954

ALLIED ASPHALT & MINERAL CORP. .. 50
Agency—Cayton, Inc.

AMERICAN BITUMULS & ASPHALT CO. T60
Agency—Wank & O'Rourke Adv. Agency

AMERICAN-BRITISH CHEMICAL SUPPLIES, INC. 68
Agency—Richard Lewis, Adv.

AMERICAN MINERAL SPIRITS CO. 28
Agency—Leo Burnett Co., Inc.

AMERICAN POTASH & CHEMICAL CORP. 44
Agency—The McCarthy Co.

ATLANTIC REFINING CO. 9
Agency—N. W. Ayer & Son, Inc.

BERKSHIRE CHEMICALS, INC. 67
Agency—Sterling Adv. Agency

CARBIDE & CARBON CHEMICALS CO., DIV. OF UNION CARBIDE & CARBON CORP. B74
Agency—J. M. Mathes, Inc.

CELANESE CORP. OF AMERICA 1
Agency—Ellington & Co., Inc.

CHEMI-FORM CORP. 34

CHICAGO BRIDGE & IRON CO. 6
Agency—Russell T. Gray, Inc.

COLUMBIA-SOUTHERN CHEMICAL CORP. 29
Agency—Ketchum, MacLeod & Grove, Inc.

COMMERCIAL PETROLEUM & TRANSPORT CO. B60
Agency—D'Arcy Adv. Agency, Inc.

COMMERCIAL SOLVENTS CORP. 47
Agency—Fuller & Smith & Ross, Inc.

COOPER ALLOY FOUNDRY CO. 61
Agency—Mahool Adv., Inc.

CORN PRODUCTS REFINING CO. 66
Agency—J. Hayden Twiss Adv.

DAY CO., INC., THE J. H. 40
Agency—Strauchen & McKim, Adv.

DEGEN & CO., INC., GEORGE T59

DIAMOND ALKALI CO. 71
Agency—Fuller & Smith & Ross, Inc.

EL DORADO OIL WORKS T74
Agency—Sidney Garfield & Assoc.

EMPIRE TRUST CO. B62

ENJAY CO., INC. 37
Agency—McCann-Erickson, Inc.

FINE ORGANICS, INC. B59

FRITZSCHE BROTHERS, INC. 36

GENERAL AMERICAN TRANSPORTATION CORP. 58
Agency—Weiss & Geller, Inc.

GENERAL CHEMICAL DIV. ALLIED CHEMICAL & DYE CORP. ..... Back Cover
Agency—Atherton & Currier, Inc.

GENERAL INDUSTRIAL DEVELOPMENT CORP. 26
Agency—J. Hayden Twiss Adv.

GLYCO PRODUCTS CO., INC. 48
Agency—Sterling Adv. Agency

GREAT LAKES CARBON CORP. 14
Agency—Davis-Parsons, Inc.

HALL CO., THE C. P. 54
Agency—Cruttenden & Eger Assoc.

HARDESTY CO., INC., W. C. T76
Agency—J. Hayden Twiss Adv.

HARDESTY CHEMICAL DIV. 3
Agency—Terrill, Belknap & Marsh Assoc.

HARSHAW CHEMICAL CO., THE 7

HOOKER ELECTRO-CHEMICAL CO. 63
Agency—Charles L. Rumrill & Co., Inc.

JOHNS-MANVILLE CORP. 13
Agency—J. Walter Thompson Co.

JONES & LAUGHLIN STEEL CORP. 27
Agency—Ketchum MacLeod & Grove, Inc.

KAY-FRIES CHEMICALS, INC. 65
Agency—Richard Lewis, Adv.

LIQUID CARBONIC CORP. 8
Agency—Fletcher D. Richards, Inc.

LUMMUS CO., THE 45
Agency—Sterling Adv. Agency

MALLINCRODT CHEMICAL WORKS .. 30, 31
Agency—The Phillip Ritter Co.

MATHIESON CHEMICAL CORP. 75
Agency—Doyle, Kitchen & McCormick, Inc.

McGRAW-HILL BOOK CO. 46

MERCHANTS CHEMICAL CO., INC. 2
Agency—Sterling Adv. Agency

METASAP CHEMICAL CORP. 72
Agency—Lewin, Williams & Saylor

MONSANTO CHEMICAL CO. 33
Agency—Gardner Adv. Co.

NATIONAL ENGINEERING CO. 4
Agency—Russell T. Gray, Inc.

NEVILLE CHEMICAL CO., THE 51
Agency—Wm. Cohen Adv. Agency

NORFOLK & WESTERN RAILWAY CO. 77
Agency—Houck & Co.

OHIO-APEX DIV. OF FOOD MACHINERY CORP. T62
Agency—Advertising, Inc.

PLAX CORP. 5
Agency—The Charles Brunelle Co.

REFINED PRODUCTS CORP. 53

ROHM & HAAS CO. 10
Agency—John Falkner Arndt & Co., Inc.

SOLVAY PROCESS DIV., ALLIED CHEMICAL & DYE CORP. ..... 2nd Cover
Agency—Atherton & Currier, Inc.

SPECTOR MOTOR SERVICE, INC. 22
Agency—Garfield-Linn & Co.

STAUFFER CHEMICAL CO. 23
Agency—J. Hayden Twiss Adv.

TENNESSEE PRODUCTS & CHEMICAL CORP. 57
Agency—The Griswold-Eshleman Co.

TOTE SYSTEM, INC. 38
Agency—Ayres & Assoc., Inc.

TRI-CLOVER MACHINE CO. 56
Agency—Russell T. Gray, Inc.

UNION BAG & PAPER CORP. .... 3rd Cover
Agency—Smith, Hagel & Snyder, Inc.

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Agency—J. M. Mathes, Inc.

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Agency—McCann-Erickson, Inc.

U.S. STEEL CO., COAL CHEMICAL DIV. 55
Agency—Batten, Barton, Durstine & Osborn, Inc.

VICTOR CHEMICAL WORKS 39-42
Agency—Russel M. Seeds Co.

tracers SECTION

Classified Advertising

H. E. Milty, Mgr.

CHEMICALS: Offered/Wanted 78
EMPLOYMENT 78
EQUIPMENT: Used/Surplus New ....
For Sale 78
Wanted 78
MANAGEMENT SERVICES 78
BUSINESS OPPORTUNITIES 78

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MARKETS . . . . . .

stone has been small, nonstock-harming doses of commercial fertilizer added to the water.

Woodhull points out how "by growing thousands of fish in farm reservoirs, ranch residents and their friends are cashing in on this new farmland product, harvested with rod and reel 'round the year." Many of the ranchers have gone into this plankton-priming game to raise bait minnows. One estimate from California has it that ponds planted with 1,500 brood stock per acre of water and properly fertilized may yield as many as 33,000 dozen fathead minnows.

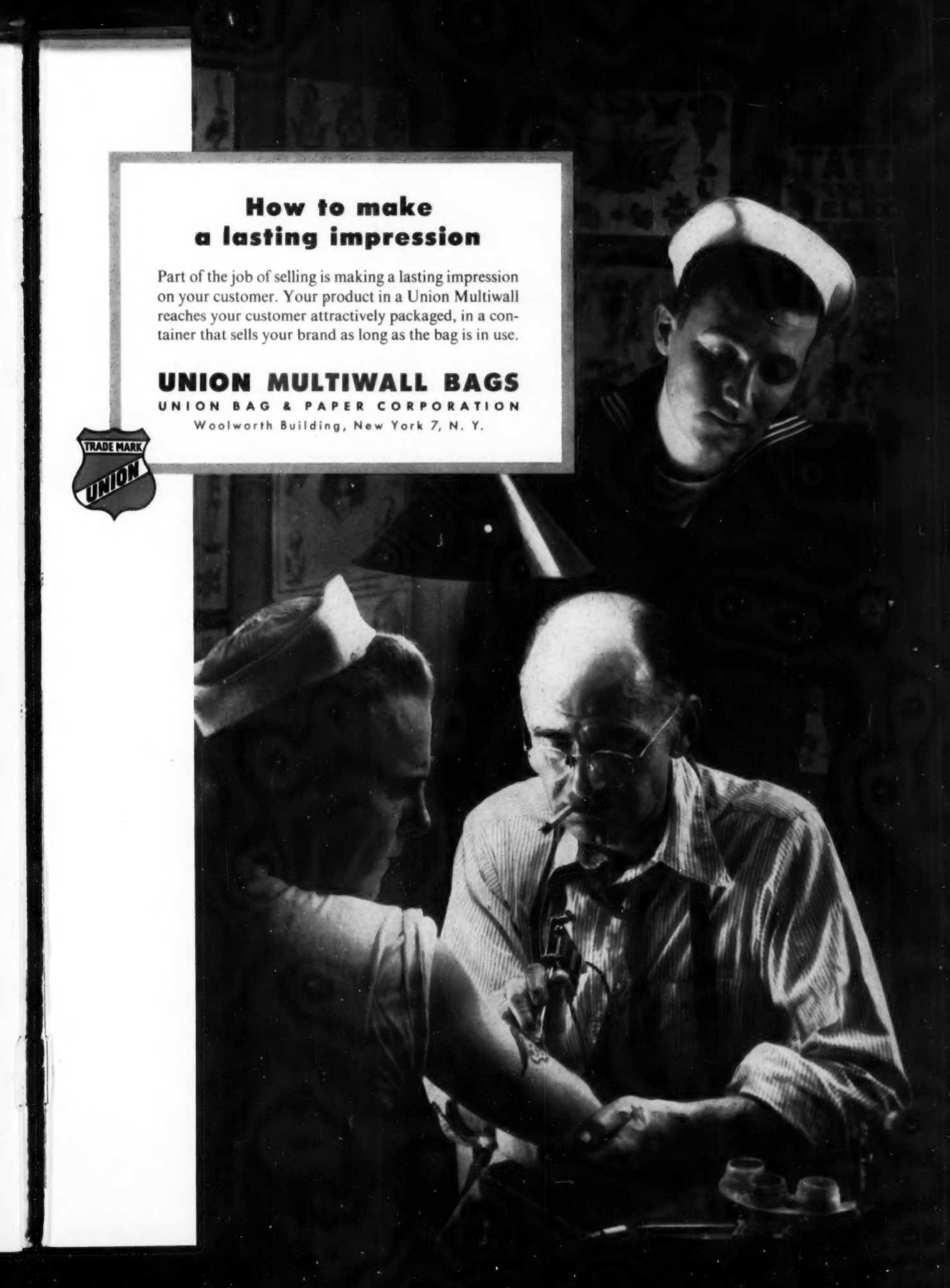
Fertilizer-spiking of ponds didn't arrive by happenstance. In the early '40s, H. F. Swingle, who headed a full-fledged experimental pond-fertilizer project at Alabama Polytechnic Institute, came up with generally bigger schools of fish by nutrient-priming his carefully controlled, closed-to-poachers ponds.

Swingle's plankton-and-fish fattening formula in recent years: apply approximately 100 to 110 lbs. of a commercial 6-8-4 fertilizer per acre of water, starting with the first warm weather. Caution: you've got to reapply the fertilizer every three or four weeks up to late September, or your investment won't likely pay off. He also recommends the addition of sodium nitrate to neutral or acid pond water, or ammonium sulfate to alkaline pond water, at a ratio of 1:10 to the commercial fertilizer.

Those with muddy ponds can look to a little different initial treatment: several applications of a mixture of three-fourths cottonseed meal and one-fourth superphosphate at two- to three-week intervals should settle the mud. When the water has cleared, the plankton diet can go back to regular commercial fertilizers.

Cecil Heacox, senior biologist of New York State Inland Fisheries, Southern District, prescribed certain climatic limits for efficient fertilizer-plumping: areas in the Southern states where warm days can be expected as early as March. Reason: the fish can add an economically worthwhile weight from the fertilizer additions only with a sufficiently long growing season.

Heacox squared away the business possibilities of fertilizer-fattened fish: "Southern sharecroppers may not be too actively interested. You've got to supplement rod-and-reel fishing with netting." California's Woodhull on the other hand, describes this fish harvesting "as one of the state's fastest expanding farm crops."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